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ON THE

THEORY AND PRACTICE

OF

MIDWIFERY.

BY

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CHARLES JOHNSON, Esq., M. D.,

THIS VOLUME

Is Dedicated,

AS A

TOKEN OF RESPECT FOR HIS HIGH PROFESSIONAL ATTAINMENTS,

AND OF

GRATITUDE FOR HIS PERSONAL KINDNESS.

"THINE IS A HIGH AND HOLY OFFICE; SEE THAT THOU EXERCISE IT PURELY; NOT FOR THINE OWN ADVANCEMENT, NOT FOR THINE OWN HONOUR, BUT FOR THE GLORY OF GOD AND THE GOOD OF THY NEIGHBOUR. HEREAFTER THOU WILT HAVE TO GIVE AN ACCOUNT OF IT."—*Hufeland.*

EDITOR'S PREFACE.

THE scope, arrangement, and general character of the Treatise of Dr. Churchill, are confessedly such as to adapt it, in an eminent degree, for the use of both the student and practitioner of midwifery. Each successive edition has been carefully revised by the author, and made to embrace every improvement that had been developed in respect to the theory and practice of obstetrics subsequent to the appearance of its predecessor, rendering, thus, the latest edition of the work, just issued in Dublin, and of which the present is a faithful reprint, a full, clear, and accurate exponent of the existing state of every department of Midwifery, whether considered as a Science or an Art.

The American Editor, in presuming to add anything to a treatise so complete and excellent as that of Dr. Churchill, may, perhaps, be considered as having performed an uncalled for labor. He, nevertheless, believes that the additions he has made will not be condemned as superfluous, but will be found, on the contrary, adapted to augment, in some degree, the value of the work.

A number of illustrations, in addition to those of the author, have been inserted where it was believed they would aid the reader in obtaining a clearer conception of the descriptions and practical directions of the text. All these additions are indicated by enclosure in brackets [ ].

There has been appended, also, with the approbation of Dr. Churchill, an extract from his "Manual for Midwives and Monthly Nurses." In this extract the exposition of the duties and the directions for the conduct of the nurse, before, during, and subsequent to labor, are presented more in detail than in the body of the Treatise.

These additions, together with the fact that the work has had the benefit of two revisions by the author since the publication of the last American edition, have caused a notable augmentation in the size of the volume, which at present contains fully one-half more matter than when last reprinted. This has rendered necessary the adoption of a smaller type, notwithstanding which the number of pages has been increased by nearly two hundred.

Philadelphia, August, 1860.

EXTRACT FROM THE AUTHOR'S PREFACE TO A FORMER AMERICAN EDITION.

"I OWE a large debt of gratitude to my kind American friends, which I gladly take this opportunity of acknowledging, and also to the profession in America for the flattering reception they have given to my volumes. No reward could be more highly valued by me, nor could anything make me more anxious, by labor and study, to make my works as perfect as possible, than the knowledge that their usefulness may extend to another hemisphere."

PREFACE

TO

THE THIRD EDITION.

THE demand for a new Edition of this work affords me an opportunity of expressing my gratitude to the Profession for their kind reception of the former ones, and of endeavoring to make the present still more worthy of their acceptance.

I have more than once carefully examined every paragraph, and have corrected or modified every expression not in accordance with the knowledge acquired by a more lengthened experience. I have not hesitated to acknowledge a change of opinion, when such appeared more in accordance with truth, nor have I felt that a doubtful expression is unwise when our information is insufficient to justify positive conclusions. It has been well observed by an eminent writer, that "He who does not in all cases prefer doubt to the reception of falsehood, or *to the admission of any conclusion on insufficient evidence*, is no lover of truth, nor in the right way to attain it on any point."

Some portions of the work have been entirely re-written, several new sections added, and one new chapter; by which means, I hope, the practical value of the work has been increased. I trust also the references to modern authorities, which I have annexed to this Edition, will be found useful. The publishers have liberally augmented the number of wood-cuts, so as to render the illustrations more complete.

The Statistical Tables have been much enlarged in this Edition: so that, as the conclusions are based upon much larger numbers, we may regard them as a nearer approximation to the truth. No doubt, as I formerly observed, an absolute and unguarded reliance upon numerical calculations may lead us into error; for in grouping together a number of cases to ascertain their positive or relative frequency, their causes, the ratio of mortality positive and comparative, etc., it is next to impossible to obtain exactly similar cases, or patients under exactly similar circumstances; for this we have to make allowance, and also for differences in habits of life, constitution, or atmospheric influences, modes of previous treatment, etc., so that we shall find abundant reason to use our statistical deductions with caution and allowance; in fact, we cannot possibly ascertain the exact truth, but only a more or less close approximation to it. But even thus far these calculations are of great value, for,

1. They lead to a habit of definite thought and statement; so that instead of general terms, we use numbers or proportion, and in so far as accuracy is attained, we give a fixed and scientific character to our observations.

2. As Dr. Simpson, in his excellent essay on the value and necessity of statistics in operative surgery, has remarked, "Statistics offer a test by which the impressions of our recorded and limited experience are corrected; and they furnish a mode of investigation capable of resolving many existing practical problems in surgery."

3. They afford us in general the only true and ultimate "measure of value" of any proposed alternative operation, or of any new practice in surgery or midwifery.

For these and other reasons I still hold the opinion that numerical calculations, applied to midwifery, are of great value, notwithstanding the numerous chances of error, and the impossibility of drawing conclusions from them with *absolute* accuracy.

In preparing this Edition I have been indebted to numerous friends for the correction of errors, for permission to make free use of their writings, to copy their plates, or to give wood-cuts of their instruments and casts. Among these I cannot but mention Dr. Shekleton and Dr. M'Clintock of Dublin, Dr. Simpson and Dr. Zeigler of Edinburgh, Dr. Dyce and Dr. Christie of Aberdeen, Dr. Oldham of London, etc., to whom, as well as to other friendly assistants, I beg leave to return my best thanks.

137, Stephen's Green, Dublin.

PREFACE

TO

THE FOURTH EDITION.

I TRUST the reader will see proofs that this Edition has undergone a careful revision. I have added what I found wanting, pruned what appeared redundant, and corrected what was vaguely or carelessly expressed. I earnestly hope that it has been rendered less imperfect and more useful.

Since the last Edition, a controversy has been in some degree forced upon me, on the operation of craniotomy, but, unlike most controversies, I do believe it has had no evil effects — has left no ill-feeling after it. Nay, I am free to confess that it has done me good, for, by obliging me to sift the question thoroughly, it has enabled me to define more precisely the grounds of the operation, and to restrict its limits in a more definite manner; and of this the students of this volume will, I think, have the benefit. As the subject has not been so fully ventilated in any English work, I have thought it advisable to append the essay I published on the question.

I allude with regret to another controversy both unpleasant and unprofitable. Dr. Francis Ramsbotham has accused me of copying many of his plates without acknowledgment, implying that I put them forth as my own. Such a thought never entered into my head. I copied from previous authors as they had done from their predecessors, mentioning in my preface to the First Edition that I had so availed myself of their labors. I regret that I did not specify with each wood-cut whence it was taken. I must now be satisfied with apologizing to Dr. Ramsbotham and all others who think that I have done them injustice, assuring them that nothing could be further from my intention than to claim a merit not justly my due. I am too old to wish for quarrels, and too busy to have time for controversy, so that I trust that what I have said will be sufficient to prevent future misunderstanding.

15, Stephen's Green, April, 1860.

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ON

THE THEORY AND PRACTICE

OF

MIDWIFERY.

PRELIMINARY OBSERVATIONS.

1. THE theory and practice of Midwifery embraces the anatomy and physiology of the organs of generation, and also the anatomy of the region in which they are contained.

A correct knowledge of the structure, magnitude, and other peculiarities of the pelvic cavity, is indispensable to a due appreciation of the mechanism of parturition: the anatomy of the organs of generation must of course be preliminary to an investigation into their functions, and it is only by a minute and accurate observation of these functions that we are able to detect and comprehend the deviations from their course; in other words, their pathology.

The four great functions of the uterine system are *menstruation*, *conception*, *gestation*, and *parturition*, which are so intimately connected, that each is dependent on the other; and for the development of either, the co-operation of several organs is necessary. A breach of this union, or the absence of this co-operation, will involve functional irregularity or inefficiency; and together with the deviations of individual organs from the normal standard, and certain organic deficiencies, will constitute the pathology of the female generative system.

2. We have thus, in a few words, a natural arrangement of subjects laid down, which I shall follow in the subsequent parts of this volume.

Part I. will include the normal and abnormal anatomy of the pelvis, and of the external and internal organs of generation.

Part II., the function of menstruation, with its abnormal conditions: and of conception, utero-gestation, ovology, etc., with their abnormal deviations, as sterility, superfœtation, extra-uterine gestation, fœtal pathology, abortion, etc.

Part III., Midwifery properly so called, that is, parturition, with its abnormal varieties.

This arrangement will bring under our notice all that relates to the theory and practice of midwifery. In addition to the description of the various functions mentioned above, there will be given full details for their management, and for the treatment of their deviations; all of which I shall endeavor to state as clearly and concisely as possible.

PART I.

THE ANATOMY OF THE PELVIS AND OF THE ORGANS OF GENERATION.

CHAPTER I.

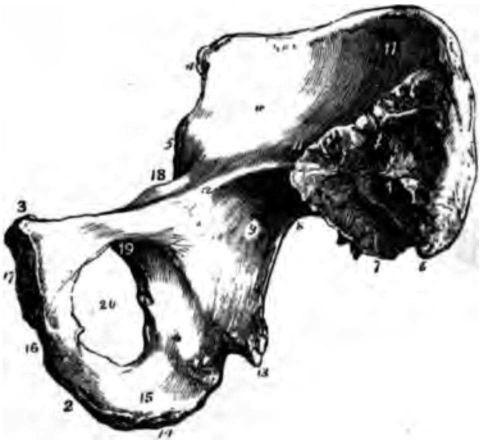
OF THE BONES OF THE PELVIS.

1. The pelvis is an irregular bony cavity, situated at the base of the spinal column, and above the inferior extremities, with which it is connected by articulations and muscles, and for which, as well as for the muscles of the trunk, it constitutes a "*point d'appui.*"

As it forms one of the two mechanical elements of parturition, it is of great consequence to understand rightly its component parts, their connections, relations, coverings, and abnormal varieties. These we shall therefore proceed to investigate at once.

2. In the adult, the pelvis may be divided into four parts or bones, viz., two, *ossa innominata*, the *os sacrum*, and the *os coccygis;* but in early life they are more minutely divisible. Let us now examine these bones separately.

Fig. 1.



Os Innominatum, inner surface.

3. Each Os Innominatum (Fig. 1), at an early period of intra-uterine life, consists of cartilage only, in which, subsequently, numerous spiculæ of ossifi-

cation are seen, and which at birth have coalesced so as to form three bones, separated by cartilage.

After birth, the process of ossification continues until these separate bones meet in the acetabulum, where they are identified with each other, and at the symphysis pubis, where the opposite ossa pubis are united by cartilage and ligaments. The breadth of each os innominatum, from the anterior-superior to the posterior-superior spinous process, is six inches, and the height from the tuber ischii to the highest part of the crest of the ilium is seven inches.

The three bones into which each os innominatum is divided at birth have received different names, and require a distinct notice.

4. The Os Ilium, *hip, or haunch bone* (Fig. 2), is the larger of the three, of a triangular shape, situated superiorly, and with its fellow forming what is called the false pelvis.

Its *external* surface (1), or *dorsum*, is convex, irregular, with elevations and depressions which serve for the attachment of the glutæi muscles. Its *internal* surface, or *venter* (10), is concave and smooth, affording a bed for the iliacus internus muscle. The *lower* portion, body or base (5), is the thickest part of the bone, and forms more than one-third of the acetabulum. Above the body, the bone spreads out into its *ala* or wing, which rises obliquely forwards, upwards, outwards, and then backwards, terminating in the crest or *crista ilii* — a semicircular ridge of some thickness, which, at its posterior part, curves downwards and forwards. Its borders serve for the attachment of the abdominal muscles, and certain ligaments to be hereafter described; and it terminates anteriorly, in the anterior-superior, and anterior-inferior spinous processes (4,5). The former afford attachment to Poupart's ligament, the tensor vaginæ femoris, the sartorius, and a portion of the rectus femoris muscles. Between the posterior spinous processes is a deep arch, — the *sciatic notch* — which is divided by ligaments into the two sciatic foramina: through the upper of these, which is the larger, pass the gluteal, sciatic, and pudic arteries, the sciatic and pudic nerves, and the pyriform muscle; whilst, through the inferior opening, the pudic arteries and nerve re-enter the pelvis, and the obturator internus muscle passes out. The posterior part of the crest of the ilium terminates in an irregularly oval rough surface, with numerous prominences, which occupy corresponding depressions in the sacrum, and constitute (with a thin layer of cartilage interposed) the *sacro iliac synchondrosis* of each side. The body of the bone is divided from the ala internally by a well-marked ridge (12), running from the junction of the ilium, with the sacrum, forward; this is part of the *linea ilio-pectinea*, and defines the boundary of the true pelvis.

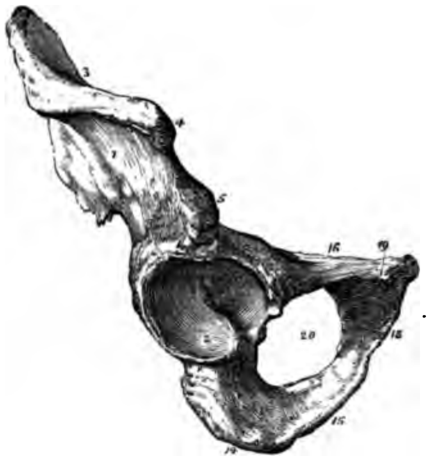
Thus we find that the ilium is connected posteriorly with the sacrum, and identified anteriorly with the ischium and pubis in the acetabulum.

5. The Os Ischium, *os sedentarium*, etc., is the lower of the three bones composing the os innominatum, and the next in size to the os ilium. Its base or body (3), which forms the inferior portion of the acetabulum, is the thickest part; below this we find a narrower portion, from which a spinous process juts out backwards and inwards, and affords insertion to part of the sacro-sciatic ligament. This process varies in length and direction, and is occasionally of some importance obstetrically. From the neck, the bone descends downwards and forwards, until, enlarging at its lower portion, it forms the *tuber ischii* (14), the bony seat, a rough, thick protuberance; and turning upwards, at an obtuse angle, becomes the *ascending ramus* (15) of the ischium. Its *internal* surface is smooth and even, and forms one of the *inclined planes* of the pelvic cavity. Its *external* surface is rough, and gives attachment to the sacro-sciatic ligament, to the semi-membranosus, semi-tendinosus, the long head of the biceps flexor cruris, and the quadratus femoris muscles.

Thus the ischium is identified with the ilium and pubis in the acetabulum, with the descending ramus of the pubis, and is connected by ligament with the sacrum.

6. The Os Pubis, *pecten or share-bone*, is the smaller and most anterior of the three bones. Its *base* is the thickest part, and forms the anterior and smaller third of the acetabulum, beyond which the bone narrows; and, proceeding forwards, constitutes the *horizontal ramus* (16) of the pubis; somewhat triangular in shape, and about half an inch in breadth. It meets its opposite at the symphysis pubis (17), and completes the anterior wall of the pelvis. From the inferior part of the symphysis, and at an acute angle with the horizontal ramus, a thin plate of bone, the *descending ramus* (18), proceeds downwards to meet the ascending ramus of the ischium, and with it to form one side of the *arch of the pubis*. Upon the angle formed by these bones and their opposites will depend the dimensions of the arch, and the facility or difficulty of the transit of the child through the lower outlet.

Fig. 2.



Os Innominatum, outer surface.

The inner and superior edge of the horizontal ramus is a continuation of the linea ilio-pectinea, which it completes; and near its pubic termination is a small spinous process, to which is attached the inner end of Poupart's ligament, and near it the pectineus muscle, whilst the inner and outer edges of this portion of the bone afford insertions to the abdominal muscles. Although I have stated that the anterior part of the bony pelvis is completed by the osa pubis and ischium, yet in the centre of each side a considerable space is left, called the *obturator foramen* (20), which is nearly closed by the obturator ligament. The object attained by this arrangement is lightness of structure where strength is not needed. The shape of these foramina is stated by Meckel, Cruvelhier, Cloquet, etc., to be oval in the male and triangular in the female. Other and opposite statements have been made, but from the observations of Dr. John Neill[1] there can be little doubt that the former opinion is the correct one, and this affords an additional distinction between the male and female skeleton. The os pubis is identified with the ilium and ischium in the acetabulum, with the ascending ramus of the ischium, and is connected with its fellow opposite by cartilage at the symphysis pubis.

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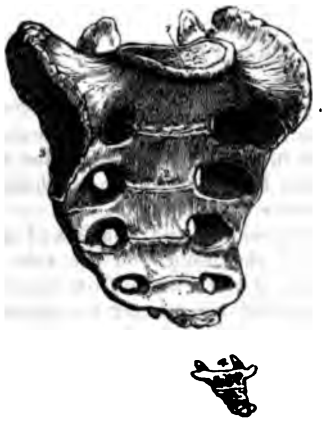
[1] Summary of Trans. of Coll. of Phys. Philadelphia, vol. iii. No. 2. Amer. Med. Jour., Oct 1850, p. 558.

Of the three bones, the ilium forms a part of the brim and cavity of the pelvis, but none of the outlet; the ischium, part of the outlet and cavity, but none of the brim; whilst the ossa pubis enter into the formation of both brim and outlet.

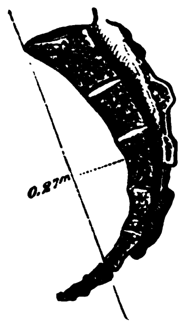
7. The Os Sacrum, *os basilare*, etc., (Fig. 3) terminates the vertebral column, and may be said to consist of several vertebræ anchylosed. Its formation commences by about thirty-five points of ossification, these shortly coalesce into fifteen; at birth the number is reduced to five (the number of vertebræ of which the bone consists), and subsequently they form but one bone. In the adult it is of a triangular shape, the base of the triangle being above, and inclining forwards; the apex below, and somewhat backwards. Its length is from four to four and a half inches, its breadth four inches, and its greatest thickness two and a half inches. M. Baudelocque found that the thickness of this bone scarcely varies a line, even in deformed pelves. Its specific gravity is small, owing to its spongy texture, so that for its size it is probably the lightest bone in the body. Its *external* surface is rough and convex, exhibiting four or five *spinous processes* like those of the vertebræ, but smaller, and diminishing in size as they descend. Anterior to these we find a continuation of the *spinal canal*, containing the *cauda equina;* with four holes on each side communicating with it, for the transmission of nerves. Its *internal* surface (2) is smooth, and concave to the amount of half an inch,[1] crossed by four transverse lines, marking the former division of its bones by cartilage; here are also four pairs of holes sloping outwards, through which pass nervous filaments, which afterwards form part of the great sciatic nerve. The upper edge of this bone completes the brim of the pelvis; the oval shape of which, however, is broken by the projection of the central portion,—the *promontory of the sacrum* (1). The lateral *surfaces* (3) are rough, uneven, and covered with a thin layer of cartilage; the irregu-

Fig. 3.



Os Sacrum.

[Fig. 4.]



Concavity of the Sacrum.

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[1] [The inner face of the sacrum is more or less concave in different subjects. When the conformation is natural, its concavity, according to M. Dubois, may be estimated at about $\frac{9}{10}$ths of an inch (fig. 4).]

larities correspond to similar ones in the ilium, and with them form the *sacro-iliac synchondroses.* This is probably the most important bone in the pelvis, obstetrically considered, inasmuch as it forms a great portion of the brim and cavity, and enters largely into the various deformities of the pelvis.

It is connected superiorly with the last lumbar vertebra, laterally with the ossa ilia, inferiorly with the os coccygis, and by ligaments with the ossa ischia.

8. The Os Coccygis, or *huckle-bone* (4), is the continuation and termination of the os sacrum and vertebral column. It is formed by four or five points of ossification in the fœtus, which do not afterwards unite, but are tipped with cartilage, and movable by a ginglymoid joint. The entire bones form a pyramid, the apex of which is below. The *external* surface is irregular, and the *internal* smooth, terminating the plane of the sacrum, and extending it anteriorly. The small sciatic ligament and the ischio-coccygeal muscle are inserted into it.

To the accoucheur this apparently insignificant bone, or bones, is of importance, as any deviation from its normal direction, or usual mobility, may influence the progress of parturition.

CHAPTER II.

OF THE JOINTS OF THE PELVIS.

9. **Before** proceeding to the consideration of the pelvis collectively, let us briefly examine the joints by which the separate bones are connected, and especially as deficient information on this subject has heretofore led to erroneous practical conclusions. I shall notice, 1, the sacro-iliac synchondroses; 2, the symphysis pubis; and, 3, the sacro-coccygeal joint.

10. The Sacro-iliac Synchondrosis, of either side, consists of a rough irregular surface on the posterior part of the ilium and the side of the sacrum, each of which is covered with a layer of cartilage from one-sixth to one-eighth of an inch in thickness; the sacral layer being the thicker, and the entire, when the bones are forcibly separated, adhering to the sacrum. At the point of junction of these two layers, their substance is somewhat softer, which has led to the erroneous supposition that it is a joint properly so called. This union of the bones is strengthened by strong ligamentous bands, which by some writers are described as the superior, inferior, anterior, and posterior sacro-iliac ligaments. They stretch across from one bone to the other in front and behind, rendering the joint perfectly immovable, unless great force be used. Additional strength also is obtained by the sacro-sciatic ligaments connecting the lower part of the sacrum with the ilium.

11. The mode in which the sacrum is inserted between the ossa ilia is worthy of notice; it resembles the position of the keystone of an arch *inverted*—*i. e.*, its transverse diameter is greater *inside* than *outside*, because the pressure which it has to resist is from within. The interposition of cartilage is probably for the purpose of diminishing the effect of shocks, and so preserving the integrity of the union.

12. The SYMPHYSIS PUBIS is situated anteriorly, and formed by the junction of the two ossa pubis, whose extremities are covered by cartilage or fibro-cartilage. It was formerly supposed that the junction was effected by the interposition of a single mass of cartilage; but the researches of Dr. W. Hunter led him to the conclusion that the end of each bone is covered with cartilage, and that between each so covered, there is a matter resembling the intervertebral substance. With this view M. Baudelocque and Dr. Burns agree, but M. Tenon thinks that sometimes the one and sometimes the other mode obtains.

Occupying two-thirds of the length, and the posterior third of the centre of this junction, we find a true arthrodial articulation, six lines in length and two in breadth, in shape like an almond, lined by synovial membrane, and containing a small quantity of synovia. M. Gardien defines this joint as "an arthrodial articulation in part, and the remainder a true synevrotic synchondrosis."[1]

13. Though the joint be weak in itself, it is strongly fortified by ligaments. The capsule is strong, and is connected with, or partly formed by, the anterior and posterior pubic and sub-pubic ligaments, which consist of interlacing fibres stretched across the joint on all sides, and firmly attached to each os pubis.

14. Ambrose Paré, Severin Pineau, and other ancient writers, with Sigault, Chaussier, Gardien, Matthews Duncan,[2] etc., among the moderns, judging from its occurrence in certain animals, have concluded that the ossa pubis are separated to a certain extent during labor, and that this joint is a special provision for increasing the antero-posterior diameter of the brim of the pelvis; and certain *post-mortem* examinations of females who died near the full term of gestation, have been adduced in proof of the fact. On the other hand this separation is denied, and I believe most justly, by Denman, Baudelocque, Boyer, Burns, Dewees, etc. M. Baudelocque, and others, have sought for it in vain in cases where no violence has been used; and, from a fair examination of the observations on record, we may conclude that it never takes place as a natural process, but that we occasionally meet it as an accident. Dr. Dewees'[3] arguments appear to me conclusive: "1. It is not stated to be more frequent in distorted than in well-formed pelves, which ought to be the case on account of the greater pressure. 2. When it does occur, it is attended with severe inconveniences, which are not observed after ordinary labor. 3. That such a separation as has been imagined, would not materially increase the antero-posterior diameter of the brim, as it would require the two ossa pubis to be separated one inch from each other to gain two lines."

I may add, that this separation can only be effected by the rupture of the pubic ligaments and sacro-iliac synchondroses, the structure of which prove, beyond doubt, that they were not intended to expand; and that when this accident does occur, it completely incapacitates the patient from moving about, by depriving the lower extremities of a firm "*point d'appui*," which, as M. Martin has recently shown,[4] can only be restored by a band passed firmly around the pelvis, and pressing the sacro-iliac synchondroses strongly together.

15. The SACRO-COCCYGEAL joint is of the kind called ginglymoid, admitting of extensive motion, especially backwards, so as to permit the enlargement of the lower outlet, in its antero-posterior diameter, at least one inch. The articulating surfaces are covered with cartilage, and between them is a synovial capsule; whilst on the outside, and entirely embracing the joint, is a fibrous capsular ligament.

[1] Traité des Accouchemens, vol. i. p. 28.

[2] Dublin Journal, vol. xviii. p. 60.

[3] Compendious System of Midwifery, p. 13.

[4] Gazette Médicale, Nov. 1851.

16. *Abnormal deviations.* Relaxation, or violent disruption of the *pubic joint* and *sacro-iliac synchondroses*, has been well described by Dr. Denman[1] and others. The most remarkable symptom is the difficulty or impossibility of sitting erect, of assuming an upright position without help, of standing or walking. There is often pain or uneasiness in the pelvic region, which may give rise to a suspicion of uterine disease; and a sense of weakness and looseness in the bones. Relief will be immediately afforded by a binder, which, by its tightness, shall supply the degree of firmness in which the pelvis is deficient; this and absolute rest are our chief remedies, and the former should be worn until a natural union takes place.

But a further evil may occur, as Dr. Denman has pointed out. Inflammation may take place in the injured joints, and matter be formed on their loosened surfaces. "When suppuration," he observes, "has taken place, in consequence of the injury sustained at the junction of the ossa innominata with the sacrum, the abscess has in some cases been formed near the part affected, and been cured by common treatment. But in others, where matter has been formed and confined at the symphysis of the ossa pubis, the symptoms of a hectic fever have been produced, and the cause has not been discovered till after the death of the patient. In others, the matter has burst through the capsular ligament of the symphysis at the inferior edge, or perhaps made its way into the bladder; and in others, it has insinuated itself under the periosteum, continuing its course till it arrived at the acetabulum. The mischief being thus extended, all the symptoms were aggravated; and the matter making its way to the surface, a large abscess has been formed on the inner and fore part of the thigh, or near the hip, and the patients being exhausted by the free and proper discharge, have at length yielded to their fate."[2] In all such cases, where it is possible, the abscess should be opened, and the matter evacuated.

17. The *sacro-coccygeal joint* may become anchylosed, and so offer a decided impediment to the dilatation of the lower outlet during labor, as we shall see by and bye.

CHAPTER III.

OF THE PELVIS COLLECTIVELY.

18. HAVING thus examined each bone of the pelvis separately, and the joints by which they are united, our next object is the consideration of the pelvis as a whole, in relation to the rest of the body, its magnitude, axes, etc.

It is connected with the trunk by the articulation of the sacrum with the last lumbar vertebra, effected in the same manner as the junction of the vertebræ with each other: with the lower extremities, it is connected by means of the hip-joints.

But the *position* of the pelvis *in situ* is very different from what we might suppose from examining it separately. The brim of the pelvis is neither horizontal nor perpendicular, but oblique. When the body is erect, the upper part of the sacrum and the acetabula are nearly in the same descending line. The obliquity has been variously estimated; that of the brim from

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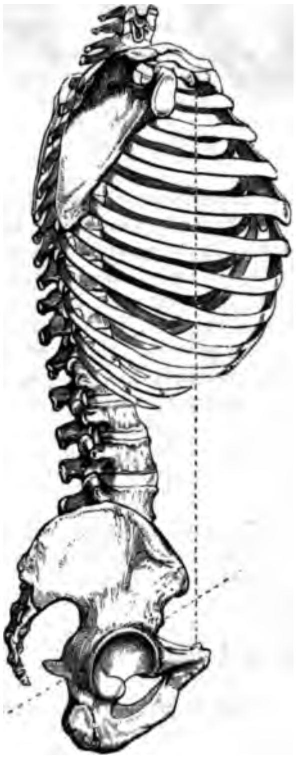
[1] Introduction to Midwifery, p. 17. 7th Ed.

[2] Ibid.

35° to 60°, and that of the outlet from 5½° to 18°. Naegelè states the obliquity of the brim to be from 50° to 60°, and that of the outlet from 10° to 11°; the point of the coccyx being seven or eight lines above the summit of the arch of the pubis, and the sacro-vertebral angle three inches nine lines higher than the pubis.

19. The advantages of this obliquity are obvious. As Dr. F. Ramsbotham has truly observed: "Were the axes of the trunk and pelvic entrance in the same line, owing to the upright position of the human female, the womb, towards the close of gestation, would gravitate low into the pelvis, and produce most injurious pressure on the contained viscera; while in the early months not only would the same distressful inconvenience be occasioned, but there would be great danger of its protruding externally, and appearing as a tumor between the thighs, covered by the inverted vagina."[1] We may add, that, when not pregnant, the patient would be obnoxious to prolapse of the uterus and the other pelvic viscera, upon making very slight expulsive efforts.

Fig. 5.



Skeleton of Trunk.

20. Now let us examine the **Pelvis** itself. It is divided by the linea ilio-pectinea into the false and true, or upper and lower pelvis. The *Upper* or *False Pelvis* is formed by the lateral divergence of the alæ of the ossa inno-

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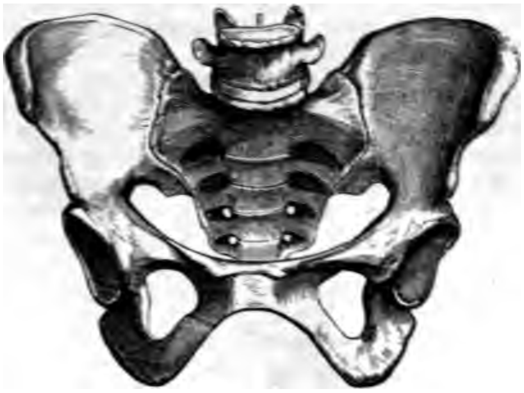
[1] Obstetric Med. and Surgery, p. 12. 2d Ed.

Fig. 6.



Front view of Pelvis.

minata. It is not of much importance obstetrically, except for the general relation which its normal size bears to that of the true pelvis, and the inference to be drawn therefrom as to the normal or abnormal condition of the latter. Dr. Burns gives the following measurements, which I believe are correct: — "From the symphysis pubis to the commencement of the iliac wing at the inferior spinous process, is nearly four inches. From the inferior spinous process to the posterior ridge of the ilium, a line subtending the hollow of the costa, measures five inches. The distance from the superior spine is the same. From the top of the crest of the ilium to the brim of the pelvis, a direct line measures three inches and a half. The distance between the two superior anterior spinous processes of the ilium, is fully ten inches. A line drawn from the top of the crest of the ilium to the opposite side, measures rather more than eleven inches, and touches in its course the intervertebral substance between the fourth and fifth lumbar vertebræ. A line drawn from the centre of the third lumbar vertebra, counting from the sacrum to the upper spine of the ilium, measures six inches and three quarters. A line drawn from the same vertebra to the top of the symphysis, measures seven inches and three quarters: and when the subject is erect, this line is exactly perpendicular."[1]

21. The LOWER or TRUE PELVIS is the part involved in parturition, and which therefore ought to be known with great accuracy. For the purpose of description, it is divided into the brim, cavity, and outlet.

22. The BRIM OF THE PELVIS is defined by the linea ilio-pectinea: it is of an oval form, except posteriorly, where the oval is broken by the promontory of the sacrum. Its influence upon labor will be understood, when we recollect that it is the first solid resistance with which the head of the fœtus meets: that any diminution in its size is more hazardous and less remediable than in any other part of the passages; and lastly, that deviations from the normal proportions of the brim most frequently entail similar ones in the cavity.

The three principal *diameters* are, the *antero-posterior* (Fig. 7[1]) from the prominence of the sacrum to the inner and upper edge of the symphysis pubis; the *transverse* ([2]) across the widest part of the brim, at right angles to the antero-posterior; and the *oblique* diameter ([3]) from the sacro-iliac

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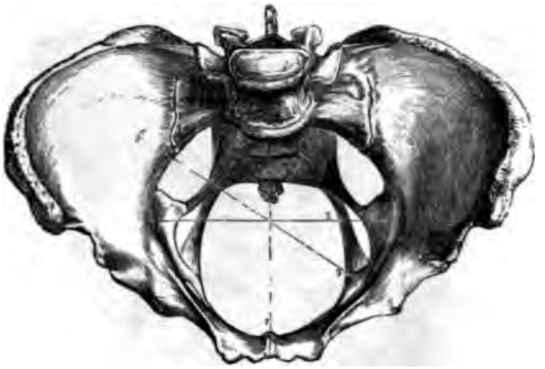
[1] Principles of Midwifery, p. 23. 9th Ed.

Fig. 7.



Brim of Pelvis.

synchondrosis of one side, to the opposite side of the brim, just above the acetabulum.

Vrolick states that, to exhibit accurately the relations between the head of the fœtus and the brim of the pelvis, their diameters should be so drawn as to intersect each other in the central point of the brim; and to do so, the anterior extremity of the oblique diameter and the transverse diameter must be rather more forward than they are usually placed.[1]

23. The measurements of these diameters are not exactly the same in different women, though the variation is but slight. I shall place the measurements given by some of the chief authorities before the reader.

	Denman.	Burns.	Ramsbotham.	Rigby.	Baudelocque.	Velpeau.	Moreau.
Antero-post. diameter...	4 in. & a fraction.	4 in.	4 in.	4·3 in.	4 in.	4 in.	4 in.
Transverse..	5	5	5¼	5·4	5	5	5
Oblique......		5⅛	5	4·8	4½	4½	4½

If we take the smallest of these estimates, there will still be space enough to admit the head of the child; and if we allow half an inch for variations, this will give us a pretty correct idea of the diameters of the brim.

The *circumference* varies from thirteen to fourteen and a half inches.

Dr. Burns has given us some other measurements: "From the sacro-iliac symphysis to the crest of the pubis on the same side is four inches and a half; from the top of the sacrum to that part of the brim which is directly above the foramen thyroideum, is three inches and a half; the line, if drawn to the acetabulum in place of the foramen, is a quarter of an inch shorter; a line drawn across the fore part of the brim, from one acetabulum to the other, is nearly four inches and a quarter."[2]

24. The CAVITY OF THE PELVIS, whose fixed boundaries are the sacrum, the ischium, and the pubis, is of unequal depth. Posteriorly it measures five inches, or six if the coccyx be extended; from the brim to the tuber ischii, three inches and three-quarters; and the depth of the symphysis pubis is from two to two and a half inches.

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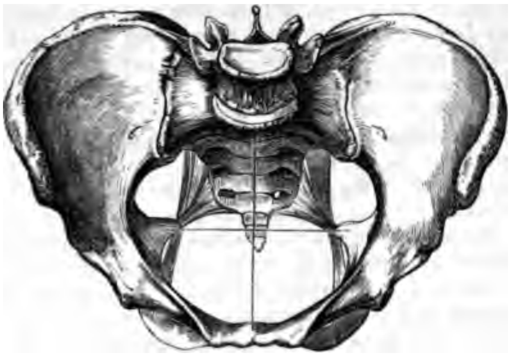
[1] Edin. Monthly Journal, Sept. 1852.

[2] Principles of Midwifery, p. 20.

25. The *antero-posterior* diameter from the hollow of the sacrum to the symphysis pubis, is about four inches and a half; the *transverse*, at right angles with the former, is about four inches and three-quarters; and the *oblique* about five inches: a variation of a quarter of an inch either way being allowed.

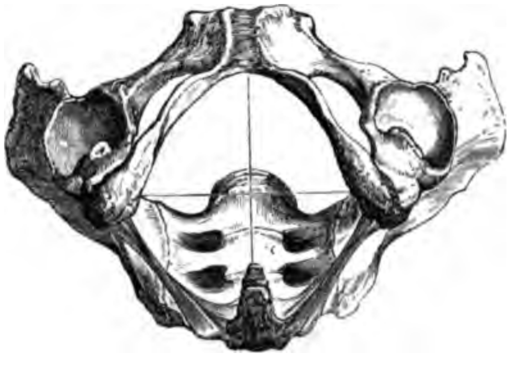
Fig. 8.



Cavity of Pelvis.

There are other measurements of considerable importance, inasmuch as the child's head passes obliquely through the cavity of the pelvis. Thus, from the sacro-iliac synchondrosis of one side to the tuber ischii of the other, is six inches; and to the ramus of the ischium, five inches: from the anterior margin of the sacro-sciatic notch, to the opposite side, is six inches, or six and a quarter; from the anterior margin of the descending ramus of the ischium, to the opposite side, at the same level, is four inches and three-quarters.

Fig. 9.



Lower Outlet of Pelvis.

26. The bones which constitute the pelvic cavity are smooth on their inner surface, and present a series of *inclined planes*, calculated to influence the direction of the fœtal head in its descent. They tend at first downwards and slightly backwards, then downwards and forwards.

27. The Outlet of the Pelvis is of an oval shape, but irregular. Its

lateral boundaries are immovable; but its antero-posterior diameter may be extended, owing to the mobility of the coccyx. The arch of the pubis, according to Osiander, forms an angle varying between 90° and 100°, and will permit the passage of a circular body whose diameter is an inch and a quarter.

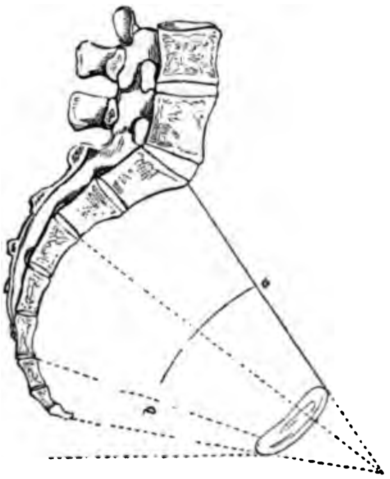
28. The *antero-posterior diameter* of the outlet, from the arch of the pubis to the point of the coccyx, is from four to five inches; the *transverse*, from one tuber ischii to the other, is about four inches; and the *oblique*, four inches and three-quarters, allowing for a variation of half an inch.

29. Now, if we compare the diameters of the brim with those of the outlet, we find that the proportions are completely changed; that which was the shortest at the brim being the longest at the outlet, and the longest diameter of the brim being the shortest at the outlet. This remarkable change is, however, effected gradually; for in the cavity we observe merely an approximation in the diameters. The effects of these changes upon the mechanism of parturition are very important, as we shall see by and bye.

30. The *axes* of the upper and lower outlet of the pelvis form an obtuse angle with each other; the *former* being described by a line running from the coccyx upward to a little above the umbilicus, and the *latter* by a line drawn from the second bone of the sacrum through the centre of the pubic arch.

If we combine these together with the *inclination* of the pelvis, we shall obtain a tolerably accurate notion of the *direction* of the canal of the pelvis. This is marked out by the central line in the accompanying figure (Fig. 10), which I have copied from one given by M. Danyau in his translation of Naegelè's work on Oblique Distortion.

Fig. 10.



Canal of Pelvis.

31. There is a considerable *difference* between the *male and female pelvis*, both in shape and size. In the former, the brim is more circular, and the cavity deeper. In the male, the depth of the symphysis pubis is nearly double that of the female; the sacrum is more perpendicular; the sacro-sciatic notches and foramina smaller; the obturator foramen oval; the

arch of the pubis is narrower, its angle being about 70° or 80°; the tubera ischii are nearer to each other, and the coccyx less movable.

From the greater width of the female pelvis, the acetabulà are further apart than in the male, although the thigh bones approach each other in their descent, and the knees (in the erect position) are nearly in contact, giving a peculiarity to the movements of the female not observable in the other sex.

32. So far, we have considered the skeleton pelvis only; but the subject would be incomplete without a brief notice of the soft parts lining the pelvis, and covering it externally. The former modify the diameters of the pelvis, and the latter must be taken into account in forming a diagnosis in the living subject.

The iliac fossæ are each occupied by the iliacus internus muscle, internal to which, and slightly overlapping the edge of the brim, is the psoas muscle; these pass over the anterior part of the brim to their insertions. Near the inner margin of the psoas muscle we find the iliac artery and vein, with the crural nerves and lymphatics. In the cavity we find the obturator internus and the pyramidalis muscles, with the hæmorrhoidal and sacral vessels, and the sacral nerves. The rectum passes down nearly in the centre of the sacrum, and the bladder lies behind and above the symphysis pubis. These parts are held *in situ* by cellular membrane, superficial and deep fascia, etc.

The lower outlet is nearly closed by soft parts, which are capable of great distension. On either side of the sacrum and coccyx are situated the sacro-sciatic ligament, the coccygeus muscle, and layers of fascia and cellular substance; whilst the termination of the rectum, and the perineum, consisting of transverse muscular fibres, fascia and cellular tissue, close the outlet posterior to the orifice of the vagina.

33. The effect of these additions, in diminishing the internal measurements of the pelvis, is not very great, except at the lower outlet. The transverse diameter of the brim is diminished about half an inch, or rather more when the psoæ muscles are in action, and the conjugate diameter about a quarter of an inch. The diameters of the cavity are not lessened more than a quarter of an inch. The lower outlet may be said to be almost closed in the absence of any distending force, the orifice of the vagina being the only vacancy; but the elasticity of the perineum, etc., occasions the soft parts to be little or no permanent diminution of the antero-posterior diameter.

34. To the crest of the ilium the abdominal muscles are attached, and on the outer surface of the ossa innominata there is a large mass of muscles, the glutæi, pyriformis, gemellus superior and inferior, obturator internus and externus, and quadratus femoris. These muscles are separated by fascia, and are covered by a thick layer of adipose tissue, and the skin. The anterior wall of the pelvis gives origin to a great number of muscles, most of which have been already enumerated.

35. The *external measurements* of the pelvis are of considerable importance in the diagnosis of deformity, as deviations externally appreciable will, in most cases, though not in all, be found to accompany internal ones. Unfortunately, the data we possess are but few; however, the following, I believe, are correct: —

The external antero-posterior diameter of the pelvis is from 7 to 8 inches.

The external transverse, between the crista ilii of each side, 13 to 16 inches.

From the anterior superior spine of one side to the other, 10 to 12 inches.

From the great trochanter of one side to the sacro-iliac synchondrosis of the other, 9 inches.

The depth of the pelvis, from the top of the sacrum to the coccyx, from 4 to 5 inches.

In order from these measurements to form a sufficiently-correct estimate of the internal diameters of the pelvis, we must deduct from them the thickness of the parietes; *i. e.*, about three inches antero-posteriorly, and four inches laterally, according to Baudelocque, Navas, and Velpeau. The depth is easily ascertained externally; posteriorly, by taking the length of the sacrum; laterally, by measuring from the anterior superior spine of the ilium, and dividing by two; and anteriorly, by taking the depth of the symphysis pubis.

It is but fair to add, that doubts have been expressed of the utility and accuracy of these measurements, by Mesdames Boivin and Lachappelle, on account of the varying thickness of the parietes of the pelvis: but, even allowing for this, they appear to me of some value as an approximative estimate.

36. In this opinion I am supported by M. Naegelè, who, in his recent work on Oblique Distortion, has pointed out certain external measurements as a means of diagnosis, and has given a careful estimate of forty-two cases. His French translator, M. Danyau, has added to these eighty cases measured by himself, and the average result is as follows:

1. From the tuber ischii of one side to the posterior superior spinous process of the opposite side, 6 inches, 6 lines.
2. From the anterior superior spine of the ilium of one side to the posterior superior spine of the other side, 7 inches, 10 lines.
3. From the spinous process of the last lumbar vertebra to the anterior superior spine of the ilium of either side, 6 inches, 7 or 8 lines.
4. From the great trochanter of one side to the posterior superior spine of the ilium of the opposite side, 8 inches, 2 lines.
5. From the centre of the inferior edge of the symphysis pubis to the posterior superior spine of the ilium of either side, 6 inches, 3 or 4 lines.[1]

These measurements are those of ordinary-sized pelves; they will of course vary if the pelvis be unusually large or small; but the utmost variation in No. 1 was 6 lines; in No. 2 was 11 lines; in No. 3 was 7 lines; in No. 4 was 9 lines; and in No. 5 was 9 lines; and these were almost all single exceptions.

37. The next point relates to the practical application of these facts, or, in other words, to the best mode of ascertaining the size of the pelvis in the living subject. A certain amount of information may be obtained from the general and equable contour of the pelvis, the breadth of the hips as compared with the shoulders, the degree of obliquity of the pelvis, the curve of the sacrum, etc.; and in many cases we may pronounce, from a cursory glance, that the patient is well or ill made. Should this not be so apparent, we must have recourse to external measurement, which is easily effected by means of a pair of curved calipers and a foot measure. Care must be taken to place the points of the instrument accurately, as a slight deviation may produce different and incorrect results. The measurements thus obtained we can reduce to the internal diameters of the pelvis by making the deductions already mentioned, although without any pretensions to absolute accuracy.

38. There is greater difficulty in ascertaining the magnitude of the pelvis internally. In Great Britain we are almost limited to the information afforded by the "*toucher;*" and undoubtedly, by this means alone, a well-educated finger may obtain a sufficiently-accurate estimate for practical purposes. When making an examination for this purpose, the finger should

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[1] Des Principaux Vices de Conformation du Bassin, par Naegelè, translated by M. Danyau.

be passed direct to the promontory of the sacrum, and thence carried forward slowly to the symphysis pubis: we may then pass it across the pelvis, in the direction of the transverse and oblique diameters, and finally follow the course of the brim, taking note of any deviation from the usual form, or of any obstacle. The state of the sacrum and cavity generally, and the mobility of the coccyx, can readily be ascertained by the finger, as well as the dimensions of the lower outlet. Although deficient in precision, the information thus obtained may satisfy us of the possibility of the passage of the child; and of course, if the patient be pregnant, and still better if she be in labor, there will be more certainty, as we shall then have the child's head as a standard of comparison.

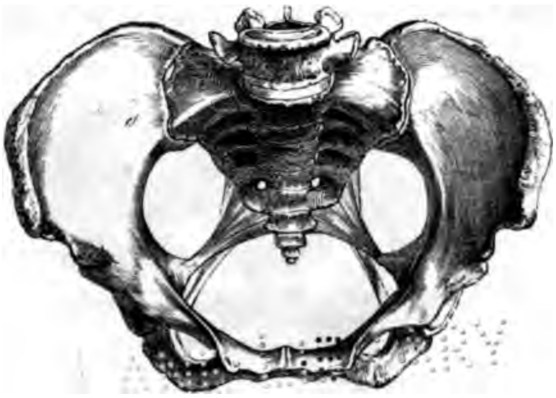
39. But, in order to arrive at greater accuracy, certain instruments have been invented, chiefly by continental obstetricians, for measuring the internal as well as the external diameters of the pelvis. Thus we have the "*compas d'épaisseur*" of Baudelocque, the "*cephalometre*" of Stein, the "*mecometre*" of Chaussier, the *pelvimeters* of De Creve, Aitken, Coutouly, Bang, Traisnel, etc., with various modifications of modern invention; but I do not think it necessary to enter into any minute description of these instruments, as they are seldom, if ever, used in these countries. The natural delicacy of the sex precludes their employment in the cases in which they would be of the greatest value: I mean, before marriage, or conception.

CHAPTER IV.

ABNORMAL DEVIATIONS IN THE PELVIS.—DEFORMITIES.

40. UNDER this title I shall include not merely distortions of the pelvis, but also certain equable deviations from its normal dimensions, which are of importance. The abnormal deviations of the pelvis may be either *general*

Fig. 11.



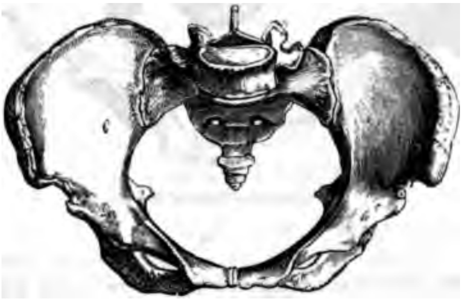
Equable Excess of Pelvis.

or *special*. The *general* or *equable* deformity of the pelvis involves the whole of the true pelvis equally, and may consist either in an *excess* or *diminution* of its usual dimensions.

41. The *former* of these (the *pelvis æquabiliter justo major* of continental writers) is not very unusual, nor is it advantageous in parturition, except perhaps in face presentations, and it may be attended with inconvenience. Giles de la Tourette has recorded one where the antero-posterior diameter was five inches and a half, the transverse six and a half, both diameters of the lower outlet five and a half, and the distance between the crests of the ilia twelve and a half inches. Dr. Burns mentions his having a very large one, but not quite equal to the one just mentioned. My friend Dr. Murphy possesses one of about the same size. The relative proportion of the diameters sometimes varies, so that the brim may assume an oval shape antero-posteriorly, or a heart shape, and still all the diameters be excessive.

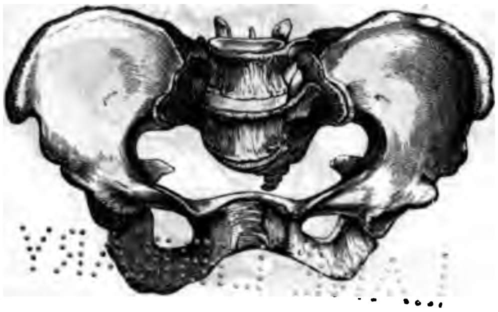
42. It is evident that a pelvis preternaturally large may be a disadvantage to a female who is not pregnant, as it will favor prolapse of the pelvic viscera; and also to one who is pregnant, by more readily permitting descents, displacements, etc. Its inconvenience during parturition consists in the want of that degree of contact with the head of the child necessary to impress upon it the usual partial rotations and changes of direction; and the facility with which it would admit of prolapse of the womb afterwards.

Fig. 12.



Equable Diminution of Pelvis.

Fig. 13.

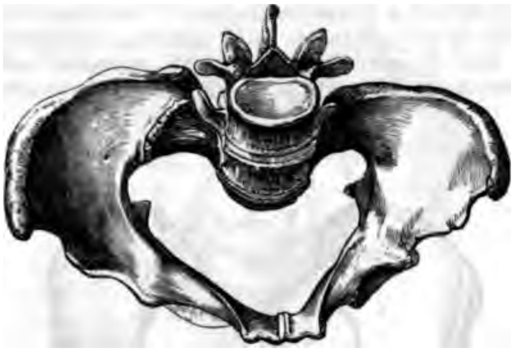


Distortion of Brim of Pelvis.

43. It is more rare to find a pelvis whose size is equally *diminished* (the *pelvis æquabiliter justo minor*), without much relative disproportion between its diameters, although Naegelè and Velpeau think it more common than writers in general have supposed; and in support of this opinion it may be added, that modern investigations have discovered that in many, if not most cases of rickets, even where there is no apparent distortion of the pelvis, there is a certain diminution (one fourth, I believe) in the aggregate diameters. The obstruction which this deformity offers to delivery is sufficiently obvious.

44. The *special distortions of the pelvis* are much more frequent. They occur at the brim, in the cavity, or at the lower outlet, but are rarely limited to one of these situations. The distortion may also occur in any of the diameters, though the antero-posterior diameter of the brim, and the transverse of the lower outlet, present them most frequently.

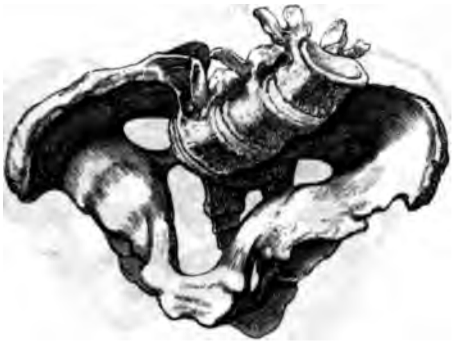
Fig. 14.



Distortion of Brim of Pelvis.

45. *At the brim* we find distortions more common in the antero-posterior diameter, as I have said; next in the oblique, and lastly in the transverse diameter.

Fig. 15.



Distortion of Brim of Pelvis.

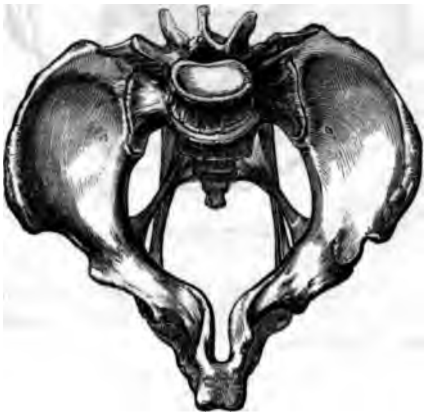
The sacrum may be pushed forward toward the symphysis, or the symphysis toward the sacrum.

If the sacrum be more slightly pressed forward, it will make the opening a heart shape, and may change the length of the oblique as well as the antero-posterior diameters.

In some cases the acetabula are pushed inwards, as well as the sacrum forwards, diminishing the oblique and antero-posterior diameters, and completely distorting the brim. This was the case with Isabel Redman, operated upon by Dr. Hull; and similar examples are recorded by Weidmann, Aitken, Mad. Boivin, etc.

In other cases, the oval of the brim is transposed, the long diameter being antero-posterior instead of transverse; as in the next figure.

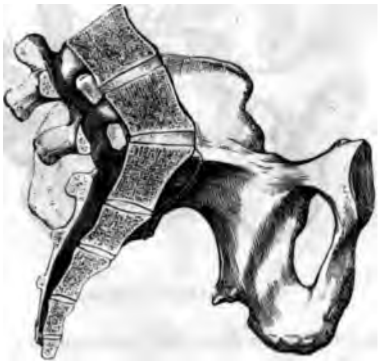
Fig. 16.



Distortion of Brim of Pelvis.

46. *In the cavity*, distortions are in most cases consequent upon those of the brim or outlet; though we occasionally meet with instances where the

Fig. 17.

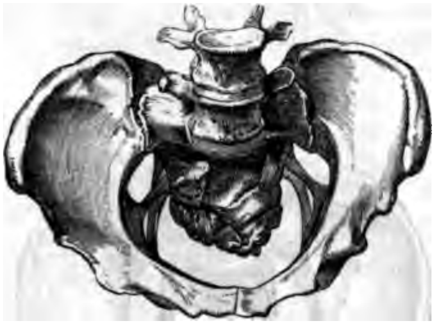


Distortion of Cavity of Pelvis.

sacrum is too much or too little curved, when the other parts of the pelvis are of normal form. In some very rare cases the cavity contracts gradually from the brim to the outlet, forming what has been called a "funnel-shaped pelvis."

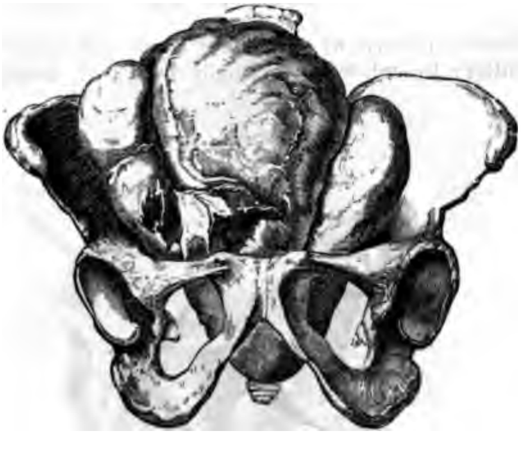
The capacity of the cavity may also be diminished by a fibrous or bony growth from the sacrum, as in the annexed figures. The first (Fig. 18) is comparatively small, though sufficient to interfere seriously with labor; the second (Figs. 19, 20), which is an exostosis, would preclude the possibility of delivery "*per vias naturales.*"

Fig. 18.



Distortion of Cavity (Exostosis).

Fig. 19.



Exostosis of Cavity of Pelvis.

The third is a fibrous growth from the periosteum: the case occurred in the Dublin Lying-in Hospital, and has been described by Dr. Shekelton,[1] to whom I am indebted for the cast from which this drawing has been taken. These morbid growths from the periosteum or bone involve the same difficulty as distortions, inasmuch as they are incompressible and immovable; but, unlike most distortions, they increase slowly, so that the longer they continue, the greater the obstacle.

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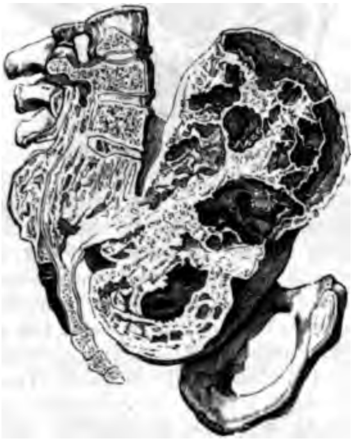
[1] Dublin Journal, vol. x. p. 287. *New Series.*

47. The *lower outlet* is comparatively independent of the brim and cavity.

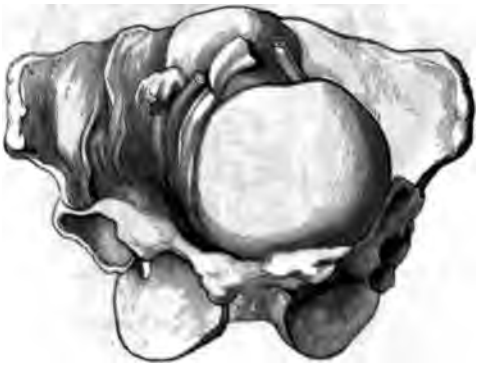
Fig. 20.



Exostosis of Cavity of Pelvis.

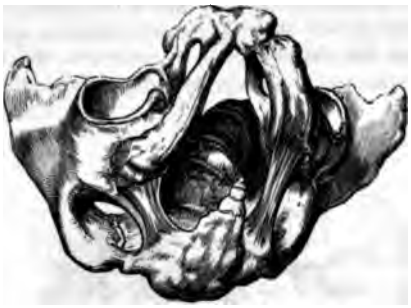
It is by no means uncommon to experience delay, arising from a narrowing of the brim, with a rapid passage of the head through the outlet; but of course, in extreme cases of distortion, the outlet participates, as is shown in the figures annexed; fig. 22 being the lower outlet of fig. 15, and fig. 23 of fig. 17. On the other hand, distortions of the lower outlet may occur with a normal shape and size of the brim. They are most frequent in the transverse diameter, owing to the approximation of the tubera ischii, which at the same time will diminish the span of the arch of the pubis, and so effectu-

Fig. 21.



Exostosis of Cavity of Pelvis.

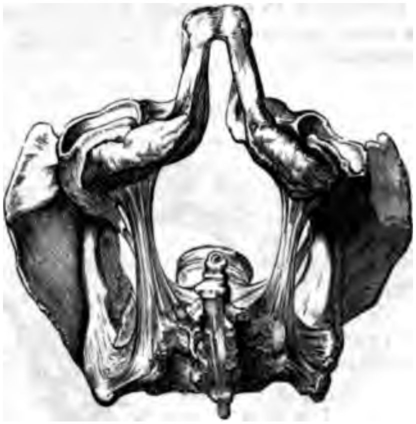
Fig. 22.



Distortion of Lower Outlet of Pelvis.

ally, though not apparently, shorten the antero-posterior diameter. The other way in which the latter diameter is lessened, is by too great a curve forward of the lower part of the sacrum and coccyx, and by the anchylosis of the coccygeal joint. There is a case related by Dr. Summer, in the American Journal of Medicine, in which the projection of the coccyx, the joint being anchylosed, was so great as to cause the death of three infants successively. The fourth time Dr. S. endeavored to straighten it, but being unable, he broke it, and the child was born alive. The same proceeding was necessary in two subsequent labors. The spinous process of the ischium may offer some obstruction, if it be unusually long, and curved inwards.

Fig. 23.



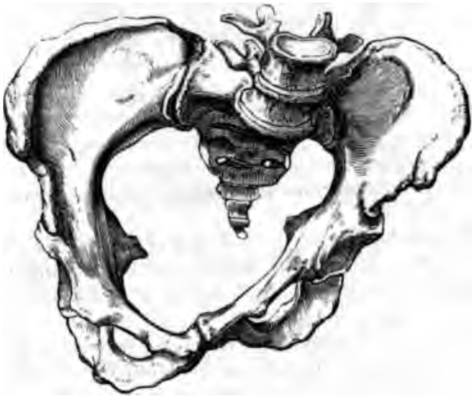
Distortion of Lower Outlet of Pelvis.

48. The *amount* of these distortions varies as much as possible: it may be so slight as merely to retard delivery; or it may be so great as to preclude it altogether, as in Mr. Bell's case, where the antero-posterior diameter was about half an inch, or in that recorded by M. Naegelè, in which it was even less.

49. In most cases of pelvic deformity the distortion is somewhat unequal, one side suffering more than the other; but there is a class of cases in which

this distortion is almost entirely confined to one side. An allusion to such will be found in several authors; but it remained for M. Naegelè to add to his high reputation by a careful and accurate description of this *oblique distortion ("das schräg verengte becken,"* or *"pelvis obliquè ovata").* In these cases (fig. 24), the affected side is flattened, and the sacro-iliac synchondrosis anchylosed. Half the sacrum is imperfectly developed; and the other, though at first sight it appears well formed, is found to be awry: the promontory of the sacrum and the symphysis pubis are not (as they ought to be) opposite to each other, but the former leans to the affected side, and the latter is pushed over (as it were) to the sounder side, so as to make the form of the pelvis oblique.

Fig. 24.



Oblique Distortion of Pelvis.

50. As we should expect, the *planes* and *axes* are altered more or less in all well-marked cases of distortion. When the promontory of the sacrum projects, the axis of the upper outlet is more horizontal; but if the acetabula are pressed inwards, it may become more perpendicular. The axis of the lower outlet may be changed in the opposite, but more frequently in the same direction, the two becoming almost parallel: nay, there is a case quoted by Velpeau, in which they were reversed: that of the lower outlet looking forward, whilst that of the brim was directed backward. In the majority of cases, I believe we may say that the planes and axes of both outlets approximate to the plane of the horizon.

51. The principal *causes* of distortion are, 1, rickets in infancy and childhood; and, 2, malacosteon, or molleties ossium, in adults. The effect of both diseases is to deprive the bony structure of the earthy matter which gives it firmness; in the absence of which, the bones become flexible, and are influenced by muscular motion, or long-continued pressure. Thus, if in such circumstances the patient maintain the sitting posture long, the promontory of the sacrum may be pushed forwards, or the symphysis upwards; the lower part of the sacrum may be too much curved, and the os coccygis rendered horizontal. If the upright position be continued long, the acetabula may be pressed inwards, and the promontory of the sacrum forwards. If the patient lie much on her back, the sacrum may be flattened; or, if on one side, it may be rendered unequal.

Besides these special deformities, it has already been mentioned, that, in patients affected with rickets, the aggregate of the diameters of the pelvis is lessened one-fourth, even when the pelvis is *apparently* unaffected.

52. Any of these special distortions may occur in the same way in adults affected with malacosteon, and at any period of their life; so that it has happened that a female, who had borne children naturally, has at a subsequent labor exhibited such an extent of pelvic distortion as required the use of instruments, or the Cæsarean operation.

Both diseases appear to be more frequent in manufacturing towns than in country districts.

53. It is extremely difficult to assign the cause of oblique distortion. Naegelè states that he could detect no traces of rickets or mollities ossium in any of his cases, nor had any suffered from external violence. The bones presented the same appearance as those of healthy young females. He believes that it neither arises from external causes, nor from internal disease; but from an original anomaly of development.[1] Dr. Rigby, however, thinks that ulcerative absorption must have existed at the sacro-iliac junction, probably in early life.

54. I have already mentioned as a cause of deformity, 3, exostosis; and may further add, 4, fractures of the pelvis, and 5, inflammation of the sacro-coccygeal joint, terminating in anchylosis, to which I have already referred, but upon which it is unnecessary that I should dwell.

55. The *diagnosis* of distortion is easy in proportion to its amount. If the pelvis be much deformed, it may be detected by an external or internal examination, and estimated with sufficient accuracy for practical purposes. But if it be only slightly affected, it will not be so easy to decide upon the possibility of the passage of the child, unless we have the head of the child, to compare with the pelvis. Without this, we must chiefly depend upon a comparison of the external measurements with those of a well-formed pelvis, and upon the information obtained by a careful internal examination. From these sources, an experienced practitioner will probably obtain data for a satisfactory though cautious diagnosis. But if we are not consulted until the patient be in labor, our task will be comparatively easy, because the head will be in apposition with the part (brim, cavity, or outlet) where we suspect the narrowing to exist.

Dr. Simpson's plan is to place the patient under the influence of chloroform, and then introduce the entire hand into the pelvis; the breadth of the knuckles, when the hand is closed, affords a definite object of comparison with the antero-posterior diameter of the brim.

A very slight degree of narrowing of the transverse diameter of the lower outlet may be detected, by its rendering the arch of the pubis more acute, and, consequently, preventing the head of the child pressing close up under it. Whenever we find the head fitting tightly between the tubera ischii, and yet a space under the arch of the pubis free, we may be certain that the tubera ischii are closer together than natural.

56. Oblique distortion may be detected in two ways, according to M. Naegelè: 1, by dropping a line perpendicularly from the spinous process of the last lumbar vertebra, and another from the symphysis pubis; when the pelvis is well formed, these two lines are exactly one behind the other: but when it is obliquely distorted, they are parallel, with a considerable interval: 2, by measuring the pelvis externally in the way already described (§ 35, 36), we find that there is always a difference between the two sides of the pelvis, varying from one to two inches. To give an example, in a pelvis affected with oblique distortion of the left side, the measurement No. 1 (§ 36), was:

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[1] The reader will find an excellent translation of Naegelè's valuable memoir, by Dr. Christie, of Aberdeen, in the British Record of Obstetric Medicine.

6 in. 11 lines on the left side, and 5 in. 8 lines on the right.
No. 2, 7 " 9 " " " 6 " 10 " " "
No. 3, 6 " 6 " " " 5 " 3 " " "
No. 4, 9 " 0 " " " 8 " 0 " " "
No. 5, 6 " 11 " " " 6 " 1 " " "

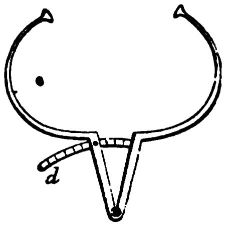
Let the reader compare these with the measurements of a well-formed pelvis, as already given, and he will be convinced that either method, or the two combined, will afford fair grounds for a diagnosis.

Anchylosis of the sacro-coccygeal joint will be discovered by its immobility when pressed by the finger during an external examination.

The effect of the different kinds and degrees of deformity upon the mechanism of parturition, and the practical considerations upon which the management of such cases must be founded, will be discussed in the Third Part of this work.

[In a great majority of the cases of reduced or distorted pelves, the degree of deviation from the natural standard, although perhaps sufficient to cause great difficulty in delivery, is nevertheless too small to be readily detected by the external measurements pointed out by the author. The calliper, or "Le compas d'épaisseur de Baudelocque" (fig. 25), so much relied on by some, is only calculated for measuring the antero-posterior diameter, and its indications are not always to be depended on here. In experienced hands, it will afford important but not conclusive testimony as to the probable distance between the promontory of the sacrum and the symphysis pubis. The manner of accomplishing this is to place the patient on her side on the bed, and then, separating the thighs, the extremity of one branch of the instrument is applied to the first spinous process of the sacrum behind, and the opposite extremity upon the middle of the symphysis in front: the intervening space is shown by the scale (*d*), and ought to be full seven inches. By deducting half an inch for the thickness of the pubis, and two and a half inches for the sacrum, four inches remains as the probable antero-posterior diameter of the upper strait, or brim. The oblique diameters are also measured by the same instrument. Placing one of its ends upon the external surface of the great trochanter, and the other on the projecting portion of the opposite sacro-iliac junction, in a well-formed pelvis, we should have about nine inches of separation. Allowing two and three quarter inches for the trochanter, neck of the femur, and acetabulum, and one inch and three quarters for the posterior symphysis, leaves four inches and three quarters as the oblique diameter. But this measurement, for obvious reasons, is less to be relied on than the first; in fact, two occasions of error exist, more or less, in both; viz., 1, In fixing the extremities of the instrument exactly on the right points; and, 2, the variations that occur in different individuals, in the thickness of the bony walls of the pelvis, and

Fig. 25.



Calliper for measuring Pelvis (Baudelocque's).

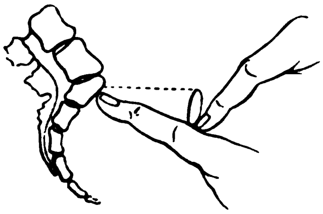
especially of the soft parts covering them. In ordinary or well-formed pelves these difficulties are not great, it is true; but when much malformation exists, they are sufficient to destroy all confidence in the accuracy of the results. In figure 23, page 55, for instance, the instrument, properly adjusted, would indicate a full-sized antero-posterior diameter, although in reality the space which is available for the passage of the child is extremely small.

A careful examination with the hand, applied along the lumbar column, the sacrum, and coccyx, and over the arch of the pubis, observing the angle formed by these parts, one with another, and, in short, their general form and proportions, will convey to one well acquainted with their normal state a more satisfactory opinion than any instrument that has yet been invented.

But there may be exostoses or other tumors within the pelvis, very seriously affecting the space, and totally undiscoverable by external examination, so that, for all certainty, internal investigation alone can assure us of the true condition of the parts. The pelvimeters of Coutouly, Mad. Boivin, and others, for internal admeasurement, have been found painful, inconvenient, and uncertain, and are now, at least in this country, entirely discarded; the only instrument here employed for such explorations is the finger;—as justly observed by a late continental writer, "It is the best and surest of all pelvimeters."

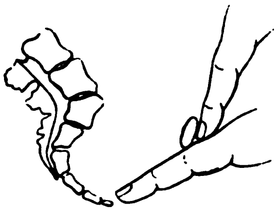
The manner of making this examination is thus described by Chailly: "To appreciate the extent of the antero-posterior diameter of the superior strait, the index finger should be passed in the vagina in the axis of the inferior strait, towards the sacro-vertebral angle, the radial side of the finger being applied immediately under the pubis. If the end of the finger does not touch the sacro-vertebral angle, it is because the diameter is of normal dimensions; or, if it is contracted, that the degree of contraction is so small that parturition will not be materially affected by it. But, if the finger readily touches the sacro-vertebral angle, there is reason to apprehend more or less difficulty. To measure, in this case, the extent of the sacro-pubic diameter, it is necessary to mark, with the nail of the index finger of the other hand, the finger introduced, directly below the pubis, the labiæ and nymphæ being carefully separated for the purpose; on withdrawing the finger, the length of the part introduced may be readily measured with a graduated scale.

Fig. 26.



Measurement of Pelvis by the Fingers.

Fig. 27.



Measurement of Pelvis by the Fingers.

"Some little allowance is to be made for the length of the oblique line represented by the finger, which, instead of passing directly to the centre of the pubis, falls under it.

"With the finger we can easily discover whether the concavity of the sacrum is augmented or diminished, which will enable us to determine whether the antero-posterior diameter of the excavation is deranged.

"The antero-posterior diameter of the inferior strait may be ascertained in the same manner as the corresponding diameter of the upper strait: the end of the forefinger being placed on the extremity of the coccyx, the hand must be raised until the radial edge of the finger touches beneath the pubis; being marked at this point, it can be measured as before described.

"The finger thus introduced enables us at the same time to judge of the flexibility or otherwise of the sacro-coccygeal joint."[1] There is indeed very little difficulty in ascertaining accurately the diameters of the inferior strait with the fingers externally applied.

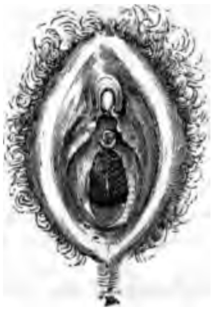
During the labor, the internal examination of the pelvis is greatly facilitated by the relaxed condition of the internal parts; and, if necessary, the hand may be introduced for the purpose.]

CHAPTER V.

OF THE EXTERNAL ORGANS OF GENERATION.

57. We may now proceed to describe the generative organs in the female. These are ordinarily divided into the *external* and *internal*, or, with regard to their functions, into the *copulative* and *formative*. The external or copulative, consist of the mons veneris, the labia majora, and minora, the clitoris, the hymen, and the vagina. The internal or formative, consist of the ovaries, the fallopian tubes and uterus. Most English writers place the vagina among the internal organs; but, as it belongs to the copulative, I have classed it with them; the point is of little importance. There is a striking analogy between the male and female organs, except as to situation; and at an early period of fœtal life, the sex cannot be distinguished. In the present chapter we shall notice the external organs.

Fig. 28.



External Organs of Generation.

58. The Mons Veneris is the triangular, cushion-like prominence at the lower part of the abdomen and upper part of the symphysis pubis. It consists of a thick layer of adipose tissue underneath the skin, upon which at

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[1] [L'Art des Accouchemens, par Chailly, 175–189.]

puberty, a quantity of hair makes its appearance. I have remarked a peculiarity in women with regard to this growth of hair. It is strictly confined to the labia and mons veneris, and scarcely ever extends to the thighs in the neighborhood of the vulva. In the cellular tissue, is lost the round ligament, and there is sometimes a small pouch of peritoneum. The skin is plentifully supplied with sebaceous glands.

The *use* of this cushion is not very evident.

59. *Abnormal deviations.*—Occasionally the growth of hair is excessive. In one case Dr. Davis found it necessary to destroy it on account of the itching it caused. On the other hand, in some cases it is nearly absent without apparent inconvenience. This part is also the seat of cutaneous eruptions and abscess.[1]

60. The LABIA MAJORA, *vel* EXTERNA, are two folds of skin externally, and mucous membrane internally, continued downwards from the sides of the mons veneris to the fourchette. Their junction superiorly constitutes the anterior commissure of the vulva, and they enclose the external organs of generation. Their breadth and thickness are greatest superiorly, gradually decreasing until they disappear near the fourchette. Superiorly they are in contact, but they are separated posteriorly. The external labia, contain, between the skin and mucous membrane, subcutaneous fascia, adipose and cellular tissue, nerves and blood-vessels, and glands. M. Huguier, in a very elaborate *mémoire*, has described these glands, which he divides into three varieties — "follicules sebacès, pilifères, et organes mucipares." The most important are, however, those he has termed the vulvo-vaginal glands, which are situated one on each side of the vaginal orifice, and a little behind it, opening by ducts about half an inch long near the hymen at the base of the carunculæ. They are about the size of a small almond, and secrete mucus profusely at certain times. They are thought to be the analogues of Cowper's glands in the male.[2] Externally, the labia are thinly covered with hair, and thickly studded with sebaceous follicles.

Their *use* is to protect the sensitive organs contained between them, and at the time of labor to facilitate the distension of the external orifice.

61. *Abnormal deviations.*—These are chiefly, 1, excessive growth, attended with mechanical inconveniences; 2, inflammation and abscess; 3, cutaneous eruptions, pruritus, etc.; and 4, encysted tumors, hernia, etc.

62. The LABIA MINORA, or NYMPHÆ, are two lateral folds of mucous membrane, internal to the labia majora, with which they are in contact externally, and by which they are generally covered in the adult. They extend from the anterior superior portion of the vulva to about the middle of the orifice of the vagina, and contain between their mucous coats a spongy vascular tissue and nerves. They enfold the clitoris, the meatus urinarius, and cover part of the vaginal orifice. In young persons they are firm and elastic, but in old age they become flabby and loose.

They doubtless contribute, with the labia majora, to maintain the integrity and sensibility of the parts they cover.

63. *Abnormal deviations.*—The nymphæ are obnoxious to inflammation, follicular ulceration, and hypertrophy, either congenital or the result of disease.

64. The CLITORIS is the analogue of the penis in the male. It consists of two corpora cavernosa, which arise from the rami of the ischia and pubis, and unite on the symphysis pubis. It possesses two muscles analogous to

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[1] It would be inconsistent with the object of a work like the present to enter into details upon the various diseases to which the parts are subject; I must therefore content myself with enumerating them, and refer the reader to my work on Diseases of Women.

[2] Mém. de l'Acad. Méd. de Paris, vol. xv. p. 528.

the erectores penis, and terminates in a gland covered by a prepuce, but which is imperforate. The clitoris projects about the eighth of an inch, and is situated just below the point of junction of the nymphæ. It is richly endowed with nerves, extremely sensitive, capable of erection, and is said to be the seat of sexual gratification. In the fœtus it is disproportionately large, but it does not increase afterwards in proportion to the surrounding parts.

65. *Abnormal deviations.*—The clitoris may vary in size from congenital malformation or disease; but the researches of M. Parent-Duchatelet[1] have disproved the opinion that it enlarges from frequent sexual indulgence; and, according to the same high authority, its excessive development does not entail extreme sexual desire.

This organ may be attacked by inflammation, or by malignant disease. Bartholinus relates the case of a courtezan whose clitoris was the seat of calcareous deposition

66. Below the clitoris there is a smooth triangular space,—the VESTIBULUM,—at the lower part of which we find the ORIFICE OF THE URETHRA, or the MEATUS URINARIUS, just at the upper edge of the orifice of the vagina. The exact situation of this opening is important, because we are frequently called upon to introduce the catheter, and in ordinary cases it should be done without exposure. The operation is not difficult: the patient being placed on her back, and the labia being separated, the point of the forefinger of the left hand should be placed just within the orifice of the vagina, so as to press slightly its upper edge: the catheter should then be passed along the inner surface of the finger, until it reaches the vestibulum, near the edge of the vaginal opening; when there, a very slight movement will cause it to enter the meatus urinarius. Or the patient may be placed on her left side, in the ordinary position for labor, and the finger carried from behind forward to the vestibulum; the catheter should then be passed along the finger in the direction of the axis of the outlet, and on reaching the vestibulum, a slight movement will detect the orifice. The operation is more difficult when the parts are swollen or distorted, as happens occasionally from disease, during pregnancy or labor, and after delivery; and if we cannot detect the orifice by the touch, we must of course use a light; and then, for obvious reasons, it is better that the patient should be placed on her side.

The orifice is round, though its sides are usually in contact, and its edges are somewhat thickened.

67. The URETHRA is a membranous canal about an inch or an inch and a half in length, dilatable, and directed obliquely from before backwards, and from below upwards, running under and behind the symphysis pubis, from which it is separated by loose cellular tissue. Internally it opens into the bladder. Its direction is subject to variation. During pregnancy, the bladder being carried upwards with the uterus, the urethra curves under the pubic arch, and then ascends perpendicularly. The same change occurs when the uterus is enlarged from other causes. In prolapse of the pelvic viscera its course is reversed. These changes should be borne in mind when catheterism is required.

68. Immediately below the orifice of the urethra we find a much larger opening, of about an inch in diameter,—the ORIFICE OF THE VAGINA. Its sides are in contact ordinarily, but it is capable of enormous distension, and of again returning to its natural size. The opening is closed inferiorly in infants, by a fold of mucous membrane of a crescentic shape, the concavity looking upwards, and which is called the HYMEN. This membrane is easily destroyed, or it may become so relaxed as scarcely to be perceptible, which

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[1] De la Prostitution de la Ville de Paris. 1836.

will account for its rarity in adults. It was formerly held to be peculiar to the human female, but the researches of MM. Duvernoy, Cuvier, and Steller have proved its existence in many animals. From very early times it has been made the test of virginity, its absence being considered conclusive proof of sexual intercourse having taken place; and the fate of the wives of Henry VIII. is an extreme instance of the injustice to which this opinion led. Modern investigations have proved, not only that it may be destroyed by many causes unconnected with sexual indulgence, but that intercourse may take place, followed by pregnancy, without its destruction, as in three cases which occurred in my own practice.

It is therefore of no value as a test of virginity.

69. *Abnormal deviations.* — The principal ones are the following: 1, it may be unusually thick and strong, so as to preclude intromission; 2, instead of the single opening superiorly, it may be pierced with several small holes; 3, instead of the usual form, the hymen may consist of a single or double bridle stretching across the orifice of the vagina; or, 4, it may be imperforate, and close the vagina completely. Examples of each kind are recorded in the different works on midwifery, and in the periodicals. These abnormal deviations are of importance only as they may prevent sexual connexion, or impede the natural discharges or delivery; and once discovered, they are easily removed.

70. The **Carunculæ Myrtiformes** are four or five small tubercles, which in most females occupy the situation of the hymen, of which they are considered the remains by most anatomists: others, however, suppose them to be small duplicatures of the mucous membrane of the vagina. They may possibly facilitate the distension of the orifice of the vagina by unfolding.

Abnormal deviations.—Occasionally they are greatly hypertrophied.

71. The parts contained within the vulva are abundantly supplied with nerves, owing to which, and to the extreme delicacy of their texture, they possess exquisite sensibility. This explains the very severe pain which accompanies even trifling diseases of these parts; and it is merely a repetition of the fact observed in other mucous membranes, viz., that they acquire their highest degree of sensibility near their junction with the skin.

72. The **Fourchette** is the inner edge of the posterior commissure of the vulva, and the anterior border of the perineum, between which is a space called the fossa navicularis; it is formed by the union posteriorly of the labia. It consists of a fold of mucous membrane, meeting externally the skin of the perineum, and is frequently, perhaps generally, torn slightly in first labors.

73. The **Perineum** is the name given to the space between the posterior commissure and the anus. It is of a somewhat triangular shape, and its medium length, in women who have not borne children, is from one to two inches. It is shorter, of course, in those who have had children. In the centre a prominent line may be observed, running antero-posteriorly, called the "*raphe.*" The perineum is composed of various tissues; externally there is the skin, then adipose and cellular tissue, fascia, a portion of the constrictor vaginæ, levator ani, transverse and sphincter muscles; besides which, it contains the superficial and transverse arteries, veins, nerves, and lymphatics. Very few hairs grow on this part.

The *use* of the perineum is obvious: it closes the lower outlet posteriorly, so as to prevent the prolapse of the pelvic viscera; whilst it admits of distension when necessary, and by its elasticity, speedily resumes its former condition.

74. *Abnormal deviations.* — The perineum is sometimes unusually long, increasing the risk of its laceration during labor; or it may be very short, and so afford inadequate support to the superimposed viscera. It may be

torn in various ways during labor, as we shall see hereafter, and either not unite or present the cicatrices of former lacerations. It is sometimes the seat of hernia, according to Smellie, Mery, and Curade.

75. The **VAGINA** is a musculo-membranous canal, extending from its orifice in the vulva (§ 68) obliquely through the cavity of the pelvis to the uterus. It passes upwards from the vulva behind and below the urethra and bladder, between the ureters, and anterior to the rectum, describing nearly the line of the canal of the pelvis (§ 30). Its form is cylindrical, somewhat flattened superiorly, but, when quiescent, its parietes are in contact. Its dimensions vary according to age, and other circumstances; for instance, it is proportionately longer in the fœtus than in the child. In some individuals it is very long, in others very short. Dr. Dewees mentions a case where it was only an inch and a half long, and I have met with others nearly as short. It is also longer and narrower in virgins than in those who have borne children. Ordinarily it is about six inches in length, by one in width.

The proper tissue of the vagina is dense, and of a grey pearly color, resembling in some degree fibrous tissue, and about a line and a half in thickness anteriorly, though less near the womb. It is well supplied with vessels, which are multiplied and interlaced so much towards its anterior extremity as to constitute a kind of erectile tissue, which has received the name of *plexus retiformis*. Internally, the vagina is lined by mucous membrane of a pink color, continued from the vulva, and which near the orifice, and there only, possesses great sensibility, except when it is the seat of inflammation, and then the whole canal is very tender. The mucous coat is disposed in the form of transverse rugæ, anteriorly and posteriorly, which, by unfolding, permit the distension of the vagina.

From the "*cul de sac*," at the inner extremity of the vagina, the mucous membrane is reflected down upon the projecting cervix uteri, and exhibits peculiarities of which I shall speak presently. In addition to its proper tissue and mucous coat, the vagina has some muscular fibres surrounding its orifice, which have received the name of constrictor vaginæ, and which serve to contract the orifice, and to draw down the clitoris. The vagina, in common with the vulva, is abundantly supplied with blood-vessels from the internal iliac arteries, and with nervous filaments from the pudic nerves. The lymphatics, which are very numerous, are derived from the hypogastric plexus. The *use* of the vagina is twofold; first, for copulation, and, secondly, for the transmission of the fœtus; and, to facilitate the latter process, the inner membrane, which in its ordinary state secretes just enough mucus to lubricate its surface, during labor, secretes it most profusely.

It has been established by the observations of Whitehead, Tyler Smith, and others, that the vaginal mucus is acid, thus differing from that of the uterus, which is alkaline.

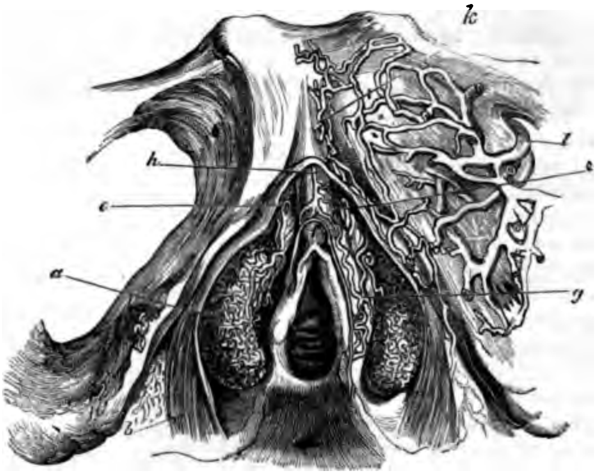
76. *Abnormal deviations.*—The vagina varies much in length, as already stated: its width differs equally in different subjects; it may be so narrow as to render intercourse difficult and painful; its exit may be closed by the hymen, or by a membrane higher up; its sides may be adherent, or the seat of cicatrices or callosities; or it may be altogether wanting.

Of course, occlusion or absence of this canal will prevent the escape of [illegible] menses, and render copulation impossible, constituting one cause of ste-[illegible] but, though a partial closure may impede intromission, it does not [illegible] impregnation impossible. I may add, that the narrowness or width [illegible] is no proof of virginity, or the contrary; for M. Parent-Ducha-[illegible] that in many of the younger prostitutes of Paris it was wide and [illegible] while in others, who had followed their degrading pursuits for [illegible] might have been mistaken for the vagina of virgins. Dr. [illegible] pointed out, what most practitioners must have observed, [illegible] after delivery, the vagina recovers its usual size and tone.

The vagina is also very obnoxious to attacks of acute and chronic inflammation, and their consequences; to lesions of nutrition, and to specific and malignant diseases.

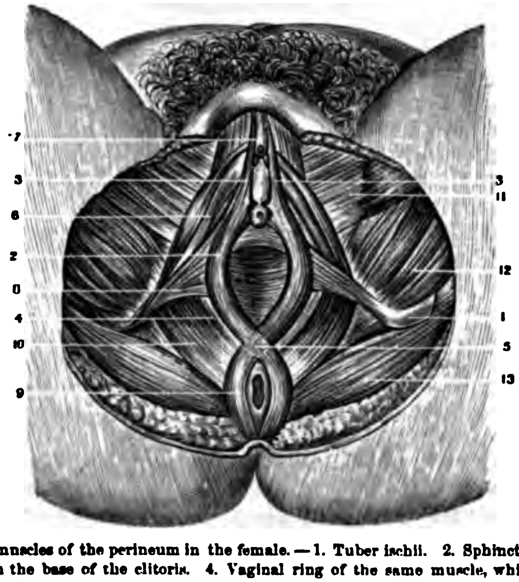
[The annexed two cuts will assist in presenting to the mind of the student a clear idea of the anatomy of the external organs of generation.]

[Fig. 29.]



Front view of the erectile structures of the external organs of generation in the female.—*a*. Bulbus vestibuli. *b*. Sphincter vaginæ muscle. *e*, *e*. Venous plexus, or pars intermedia. *f*. Glands of the clitoris. *g*. Connecting veins. *h*. Dorsal vein of the clitoris. *k*. Veins going beneath pubes. *l*. The obturator vein.

[Fig. 30.]



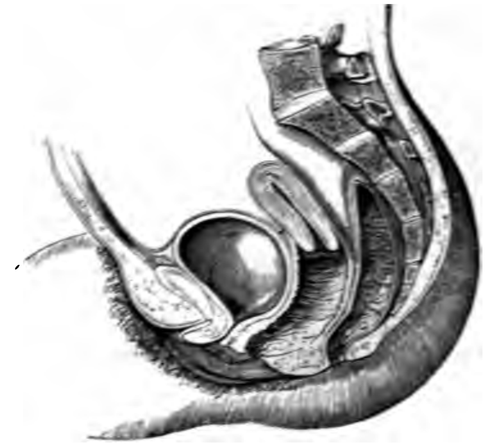
A view of the muscles of the perineum in the female.—1. Tuber ischii. 2. Sphincter vaginæ muscle. 3. Its origin from the base of the clitoris. 4. Vaginal ring of the same muscle, which receives a part of the fibres of the levator ani. 5. Intercrossing of the sphincter ani and sphincter vaginæ muscles at the perineal centre. 6. Erector clitoridis muscle. 7. The clitoris covered by its prepuce. 8. Transversus perinei muscle of the female. 9. Sphincter ani. 10. Levator ani. 11. The gracilis. 12. Adductor magnus. 13. Posterior part of the gluteus magnus.

CHAPTER VI.

OF THE INTERNAL ORGANS OF GENERATION.

77 ACCORDING to the arrangement I have proposed, our next subject is the *formative*, or *internal* organs of generation. But before we proceed to take them in detail, it will not be unprofitable to direct the attention of the student to the relative situation of the pelvic viscera, as shown in the next engraving.

Fig. 31.



Section of Pelvis.

Proceeding from before, backwards, we find the urethra running in an oblique direction, antero-posteriorly, and from below, upwards, under the arch of the pubis, and then merging in the bladder, which, when distended, rises about half its height above the symphysis pubis. Below the urethra, but with an interval between them, is the vagina, running its oblique course to the os uteri, which is a little above the level of the pubes. The position of the uterus is not vertical, but inclining a little forward, with its fundus above the level of the bladder. The peritoneum is reflected from the abdominal parietes, on the fundus and posterior wall of the bladder down to the commencement of the cervix uteri; from whence it passes over the anterior surface, fundus, and posterior surface of the uterus, and on to the posterior wall of the vagina, down to about an inch below the level of the os uteri, from whence it is reflected upon the rectum. The latter organ lies between the uterus and the sacrum, and a little to the left side of the uterus. I do not of course mean that this exact position of the parts never varies, but the sketch I have given is sufficiently accurate for practical purposes; and it is very important for the practitioner to be acquainted with the position and elevation of the pelvic viscera.

We may now pass on to the description of the uterus, fallopian tubes and ovaries.[1]

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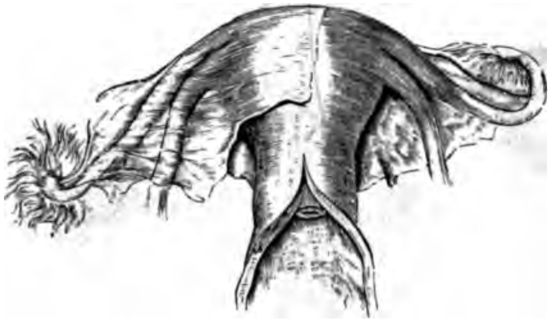
[1] I beg to refer the reader for more minute details than I have space for, to Dr. Farre's able article in Dr. Todd's Cyclopædia of Anatomy and Physiology, Parts 49, 50.

78. The **Uterus** is the receptacle provided for the nutrition, maturation, and, ultimately, for the expulsion of the fœtus. It is the largest of the generative organs, and is peculiar to the human female, though there is an approach to such an organ in the mammalia. It is a hollow symmetrical viscus, in shape somewhat triangular or pyramidal, resembling a flattened pear, but rounder posteriorly than anteriorly; situated, as we have just seen, in the centre of the pelvis, behind the bladder, above the vagina, below the small intestines, and in front of the rectum. For the convenience of description, anatomists ordinarily divide it into the *fundus*, or that part above a line drawn from the orifice of one fallopian tube to the other; the *cervix*, or the narrow and inferior part; and the *body*, or that part between the fundus and cervix. Dewees maintains that the cervix differs essentially, in structure and function, from the rest of the uterus. The microscopic researches of Dr. Tyler Smith have shown certain peculiarities of arrangement, and differences of structure, in its internal and external mucous membrane; its general structure is more dense, less vascular, and the menses are not excreted by this part. In the unimpregnated state it projects into the vagina about half or three-quarters of an inch, the anterior lip being the lower.

79. The uterus gradually assumes its normal form during fœtal and infantile life. Dr. Rigby remarks, that it is at first divided into two cornua, and usually continues so until the end of the third month, or even later; the younger the embryo, the longer are the cornua, and the more acute the angle which they form; but even after this angle has disappeared, the cornua continue for some time longer. The uterus is at first of an equal width throughout; it is perfectly smooth, and not distinguished from the vagina, either internally or externally, by any prominence whatever. This change is first observed when the cornua disappear, and leave the uterus with a simple cavity. The upper portion is proportionally smaller, the younger the embryo is. The body of the uterus gradually increases, until, at the period of puberty, it is no longer cylindrical, but pyriform. Even in the full-grown fœtus the length of the body is not more than a fourth part of the whole uterus; from the seventh to the fourteenth year it is only a third; nor does it reach half until puberty has been fully attained. The os tincæ, or os uteri externum, first appears as scarcely a perceptible prominence, projecting into the vagina. The parietes of the uterus are thin in proportion to the age of the embryo. They are of equal thickness throughout, at first; at the fifth month, the cervix becomes thicker than the upper parts;

Fig. 32.

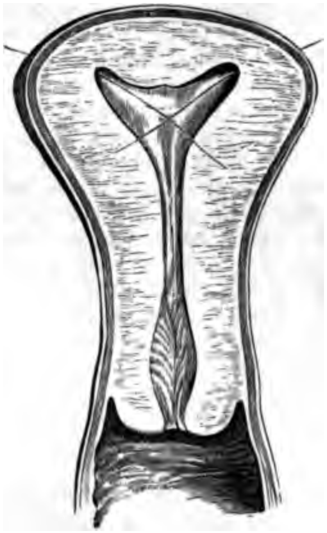


Uterus, Tubes, and Ovaries.

between five and six years of age, the uterine parietes are nearly of an equal thickness, and remain so until the period of puberty, when the body becomes somewhat thicker than the cervix.[1]

80. The adult healthy uterus may vary a little in size, but the following measurements, given by Dr. Burns,[2] are sufficiently accurate. "The length of the uterus, from the margin of the lip to the fundus, is two inches and three-quarters; breadth between the insertion of the fallopian tubes, from two inches and three-eighths to two inches and five-eighths; the middle of the fundus rises a quarter of an inch above a line drawn from the insertion of one tube to that of the other; the commencement of the body is an inch and a quarter broad, its thickness is an inch; the whole of the wall is half an inch, but at the fundus it is seven-eighths, or one-eighth of an inch less. The thickness of that part of the cervix which projects into the vagina, including the coat of that canal which is reflected over it, is an inch and one-eighth; its breadth an inch and a quarter. The breadth of the termination or lips of the os uteri, an inch and one-eighth; thickness, including both lips, three-quarters of an inch. The length of the transverse chink, or os uteri, from three-eighths to half an inch; each lip is three-eights of an inch thick, though the posterior is said to be the thinnest." "From the margin of the lip to the top of the cervix is an inch, but sometimes only three-quarters, or even less. From the top of the triangular cavity of the fundus to the end of the narrow cylindrical cavity of the body is an inch and one-eighth; the extreme breadth of the top of the cavity stretching from the entrance of one tube to that of the other is nearly an inch and a half."

Fig. 33.



Cavity of the Uterus.

According to the calculations of Levret, its superficies may be reckoned at sixteen inches, and its cavity at eleven-twelfths, or about three-quarters of a cubic inch.

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[1] Library of Practical Medicine, vol. vi. — Midwifery; p. 16.

[2] Principles of Midwifery, p. 50.

The weight of a virgin uterus, according to Meckel, is from seven to eight drachms; but after child-bearing it amounts to an ounce and a half.

81. The *Os Uteri*, or *Os Tincæ*, is situated at the lower part of the cervix, varying in form in different individuals; in many it is a transverse chink or slit, in others a circular opening, and in some triangular, resembling a leech-bite, especially in those who have borne many children. It is generally about the size of a goose-quill, or rather smaller.

The *Canal of the Cervix* is from half to three-quarters of an inch long, leading from the os uteri; it first widens and then contracts again where it enters the cavity of the uterus, marking the *os uteri internum*, as it has been called. Between the os uteri externum and internum the mucous membrane is curiously disposed in rugæ, branching out from a central line; this has been called the *arbor vitæ*. The internal surface of this canal is thickly studded with mucous follicles, called *glandulæ Nabothi*, and which, after impregnation, secrete a thick mucus which blocks up the canal.

The cavity of the uterus is of a triangular shape, the base being upwards; its dimensions have already been given.

82. Much difference of opinion has existed, and many discussions have taken place, as to the structures which compose the uterus; though of late years the opinions of authors are more harmonious. It possesses three distinct tunics: I. We have already seen (§ 77) that it is covered anteriorly and posteriorly by *peritoneum*, which is reflected laterally to the sides of the pelvis, near the sacro-iliac synchondroses, forming the *broad ligaments of the uterus*, or the *alæ vespertilionis*, on each side, containing the fallopian tubes, ovaries, and round ligaments. From their attachment to the pelvis they may, perhaps, serve as supports to the uterus, at least before conception. This serous covering is identical with the lining of the abdomen.

83. II. The *Middle Coat of the Uterus* is by some asserted, and by others denied, to be muscular; but this really appears to me little more than a dispute about the name, for those who deny its muscularity admit that it performs the functions of a muscle. Mr. Rainey has examined very minutely with the microscope the middle coat of the uterus, and finds that it is made up of "fusiform nucleated fibres, contained in a matrix of exceedingly coherent granular matter. The average breadth of one of these fibres, at its dilated or nucleated part, is about $\frac{1}{4000}$th of an inch. Their length cannot be ascertained with certainty, as it is impossible to estimate the degree of curtailment which they suffer in being separated from the granular matrix in which they lie embedded."[1] The fibres belong to the class of non-striated or involuntary muscles. This middle coat differs in color from ordinary muscle, being yellowish, with a faint tinge of red, like the middle coat of arteries, and it is much more dense than muscular tissue. It consists of fibrous structure, though it is not easy to trace the course of the fibres in the unimpregnated womb; however, when the uterus is enlarged from impregnation or other causes, it can readily be done, and they may be divided into several sets. The superficial set are very irregular, interlacing with each other in every direction, though with a general tendency from the fundus towards the cervix; but some regularity is observable in the deeper sets; for instance, there is a circular arrangement around the orifice of each fallopian tube, and at the os uteri; a layer diverging from the middle line anteriorly and posteriorly, and perpendicular bands descending to the os uteri. Among these more regular layers there are irregular fibres interspersed. From the middle coat fibres are sent off to the fallopian tubes and round ligaments.

84. III. The *Mucous Coat.* — A considerable number of distinguished

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[1] Philosophical Trans.: 1850. Part ii., p. 519.

foreign writers, among whom we find Morgagni, Assoguidi, Chaussier, and Moreau, have denied the existence of any lining membrane in the uterus, from the difficulty of separating and demonstrating it. I cannot understand this; for it has always appeared to me very evident, even in a state of health and quiescence, but still more when the seat of disease or pregnancy.

Others, as Dewees, Boivin and Dugès, etc., do not question the presence of a lining membrane, but contend that it is not mucous; and apparently for the sole reason that one of its functions (menstruation) is not a function of mucous membranes. This objection, however, is refuted by the fact that other mucous membranes do occasionally secrete a fluid apparently identical with the menses (vicarious menstruation); and we may add, that the uterine membrane presents the anatomical and histological characteristics of mucous membrane; that it secretes mucus, undistinguishable from that of the vagina. Its pathology also is that of mucous membranes.

For these reasons I have no doubt that the uterus is lined by mucous membrane, continued from the mucous membrane of the vagina after it covers the cervix uteri. Dr. Tyler Smith has recently published some very interesting and original microscopic researches on the structure of the mucous membrane covering the cervix and lining its canal, of which I shall give a brief abstract, especially on account of their bearing upon disease. The external mucous membrane consists of epithelium, basement membrane, fibrous tissue, bloodvessels, and nerves, like other mucous membranes. The special peculiarities are as follows: The epithelial layer is tessellated or squamous, and so arranged as to form a membrane of considerable thickness. Immediately beneath, the basement membrane covers the villi; each villus contains a looped bloodvessel, passing to the end of the villus, and returning to its base, where it inosculates with the bloodvessels of the neighboring villi. The villi are everywhere covered by pavement epithelium, which renders the external surface smooth. The points of the villi are nipple-shaped, with a depression in the centre. From Dr. Smith's researches, it appears doubtful if the external surface possesses any mucous or glandular follicles. Just within the os uteri a small extent of smooth surface is found, with villi covered by cylinder epithelium, like those of the intestines; these villi being three or four times larger than those of the external surface, and containing one or two looped vessels. Underneath the villi of this part, and externally, a dense fibrous and vascular tissue is found, mixed with involuntary muscular fibres and nerve fibres. Higher up, we find the peculiar structure of the cervical canal. It exhibits four columns of oblique, curved, or transverse rugæ, with four longitudinal grooves or ridges. Under the microscope, these rugæ, and the fosse between, are found to be divided and subdivided many times, and these rugæ, and even the secondary septa, are covered with mucous follicles so numerously, that Dr. Smith calculates that in a well-developed virgin cervix uteri there must be 10,000 mucous follicles. The villi of this portion of the canal are numerous, and covered with cylinder epithelium. Thus we have a provision made for a very large extent of glandular secreting surface; in fact, Dr. Smith calls the cervix "an open gland," and he regards this as the principal seat of leucorrhœa. The normal mucus secreted by this portion is very viscid, and almost transparent. It adheres to the crypts and rugæ, and fills the canal of the cervix. It has an alkaline reaction, whilst that from the cervix externally is acid. It consists of minute corpuscles, caudate corpuscles, minute oil globules, and occasionally dentated epithelium, in a thick, tenacious plasma; and its use, Dr. Smith thinks, is to close the canal of the cervix, and probably to afford a suitable medium for the passage of the spermatozoa into the uterine cavity.[1]

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[1] Med.-Chir. Trans., vol. xxxv., p. 377.

85. The *Arteries* of the uterus are four in number, furnished by the aorta, the hypogastric, and emulgent arteries. The two superior — the spermatic — arise from the aorta or emulgent arteries, and descend along the sides of the womb in a serpentine course; they are distributed to the upper part of the uterus, to the fallopian tubes and ovaries. The two inferior — the uterine arteries — given off by the hypogastric arteries, run along the sides of the uterus, to within a short distance of the lips, then divide, and supply the cervix and upper part of the vagina. The spermatic and uterine arteries anastomose freely with each other.

86. The *Veins* are more numerous than the arteries, are capable of greater distension, and lie superior to their corresponding arterial branches. They possess no valves, and, like the arteries, are of small size so long as the genital system is quiescent, but increase very greatly during pregnancy, when they form what have been called the uterine sinuses.

87. Some uncertainty has existed as to the *Nerves* of the uterus; but the researches of Drs. R. Lee, Robin, Snow Beck, and Hirschfeld, added to those of their predecessors, have rendered our information more complete. They arise from the aortic plexus, and from the hypogastric nerves and plexus, being a mixture of spinal and sympathetic nerves. I shall take the liberty of quoting Dr. Lee's account of a dissection of these nerves in the unimpregnated uterus: "The aortic plexus, the hypogastric nerves and plexuses, were all much smaller than in any of the gravid uteri I had previously seen. From the fore and middle part of the left hypogastric plexus a small branch passed down on the inside of the ureter, to the trunk of the uterine artery and veins, which was surrounded by a plexus of nerves, as in the gravid uteri before examined. From this, branches passed upwards to the fundus uteri, and a communication between these and the spermatic nerves was quite evident. From the left hypogastric plexus, numerous branches passed also directly into the uterus, without entering the ganglia at the cervix, which ramified on the peritoneum behind, and on the muscular coat. Branches from the posterior part of the hypogastric plexus communicated with some branches of the sacral nerves behind the ganglion. The trunk of the left hypogastric nerve was easily traced through the plexus to the upper part of the ganglion, which was remarkably large and distinct, and consisted of white and grey matter. Into the posterior part of the ganglion the third sacral nerve sent numerous branches. From the anterior margin of the ganglion a broad band of white and grey nerves passed round the outer surface of the ureter, and, after uniting with a similar band on the inside, sent branches to the plexus surrounding the uterine artery and vein, and also branches to the anterior surface of the uterus. Large flat nerves were seen passing off from the anterior border of the ganglion, to the bladder and vagina, and from its inferior and posterior borders to the vagina and rectum. A great number of nerves likewise passed off from the inner surface of the ganglion into the cervix uteri. The nerves sent off from the ganglion were both larger and more numerous than those which entered it. A great web of nerves was seen under the peritoneum, both on the anterior and posterior surface of the uterus, intimately connected with the nerves sent off by the ganglion and hypogastric plexus."[1]

88. The *Lymphatics* are very numerous, though very small, in the unimpregnated uterus. The most numerous set of these vessels runs from the upper part of the body and cervix of the womb along with the spermatic vessels, and with those from the ovary, in front of the psoæ muscles, and terminates in the glands, in front of the aorta, vena cava, and lumbar vertebræ. Another set accompanies the uterine artery, and issues with the round liga-

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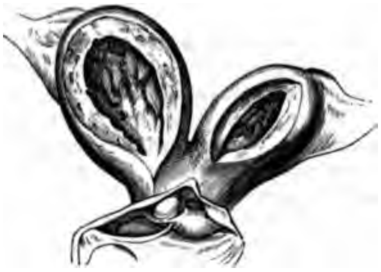
[1] The Anatomy of the Nerves of the Uterus, by Robert Lee, M. D, etc., p. 7.

ment through the inguinal ring. A third set joins the lymphatics of the vagina, and enters the hypogastric plexus.

89. The lower portion of the uterus is within the reach of a vaginal examination, so that we can estimate its size, temperature, integrity, mobility, sensibility, etc.; and by the use of the speculum we are able to ascertain its color, the state of its surface, and, if necessary, to apply local remedies. Further information as to its condition may be obtained in many cases by abdominal manipulation; and, in the case of enlargements, by the application of the stethoscope. An examination "*per rectum*" is of value in certain diseases of the uterus, and especially of the ovaries.

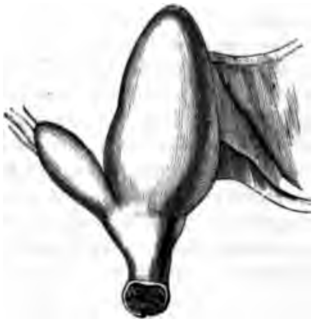
90. *Abnormal deviations.* — 1. The uterus may be altogether wanting; several such cases are on record.[1] 2. The canal of the cervix may be extremely narrow throughout, or it may be the seat of stricture. 3. It may be closed, either by the union of its sides, or by the mucous membrane being continued over the os uteri. 4. The uterus may be malformed; and it is remarkable that these malformations, which are owing to an arrest of development, appear to reproduce the analogous organs of lower classes of animals; for instance, the *double uterus*, (fig. 34) resembles in some degree the tubular oviduct of birds, it opens by two ora uteri into the vagina; or both the uteri and vagina may be distinct.[2]

Fig. 34.



Double Uterus.

Fig. 35.



Uterus Bicollis.

The *uterus bicollis* (fig. 35) exhibits two bodies with but one os uteri, and resembles the organ of some rodentia and carnivora.

Again, the junction of the cornua may take place higher up, constituting the *uterus bicorporeus;* here the lowest part of the body of the uterus is single, and the upper double.

In the *uterus biangularis* the body of the womb is tolerably well formed, and terminating in cornua, as in the monkey tribes. Several intermediate stages of this progress, from the lowest to the highest form of a single uterus, have been noticed, but I shall only add two more illustrations; one when the uterus is double, opening by two orifices into two separate vaginæ (fig. 36), and another when the uterus was separated into two cavities by a septum, but having only a common opening inferiorly (fig. 37.)

These congenital malformations are by no means very rare; Dr. Cassan collected forty-one examples, and many others have since been recorded.

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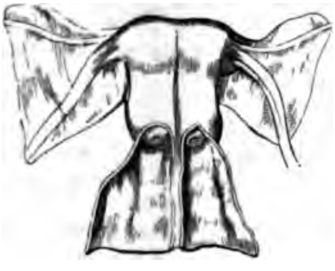
[1] Kussmaul has published a volume devoted to these and analogous deviations; see also cases by Dubois, Lancet, Dec. 8, 1855.

[2] Amer. Journ. of Med. Science, p. 331. Oct. 1852.

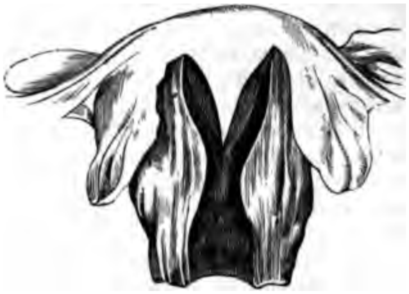
The effect of the three first abnormal deviations will be either the absence of menstruation, and consequent sterility, or inefficient or painful menstruation. The deviations from arrest of development may exert no injurious influence upon menstruation or conception, but they have been adduced to explain the phenomenon of superfœtation, as it is pretty certain that a double conception may take place; and, when it is single, the vacant cavity is lined by decidua. In addition, the uterus is the seat of many forms of disease.

Fig. 36.



Double Uterus.

Fig. 37.



Double Uterus.

[A singular instance of malformation of the uterus is recorded by M. Lecluyse. The subject of it "was a small female, who had previously been twice confined with an arm presentation. The occurrence of the same accident for the third time caused the accoucheur to make a minute examination, in order, if possible, to find an explanation of so unusual a circumstance. The result of the investigation was, the womb, instead of being of the natural pyriform shape, had its greatest diameter in a transverse direction; so that the long axis of the elliptic form which the fœtus occupies in utero was horizontal. This anomaly was thought by M. Lecluyse to account for the three consecutive arm presentations."[1]]

91. The FALLOPIAN TUBES are two cylindrical canals, about four inches long, proceeding from the upper angles of the uterus. They are contained in the superior and lateral folds of the broad ligaments. Internally, they open obliquely into the uterus, at which point the canal is narrow; it afterwards expands, and then again contracts towards its external termination, where it is open to the abdomen. Externally, the tubes are of equal thickness for about three inches and a half, when they expand, and terminate in a fringed process, called the *fimbriæ*, or *morsus diaboli*, which is applied to the ovary during impregnation. The tubes are covered externally by peritoneum, beneath which is their proper tissue, with some circular and longitudinal fibres, derived from the middle coat of the uterus. Internally, they are lined by mucous membrane, disposed in longitudinal folds, the villi of which are highly developed after impregnation. The tubes share in the vessels and nerves by which the ovaries are supplied.

Their *function* is the transmission of spermatozoa to the ovary in the first instance, and afterwards of the impregnated ovum to the uterus; in fact, they are the excretory ducts of the ovary.

92. *Abnormal deviations.*—The tubes, one or both, may be impervious, from disease, or as a congenital malformation. The closure of both of course entails sterility. They are also subject to inflammation and its consequences, and to malignant diseases.

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[1] [Ranking's Abstract, p. 240, American edition, from Journal de Chirurgie, Mars, 1845.]

93. I have already stated that the *round ligaments* are formed by fibres, derived from the middle coat of the uterus. Mr. G. Rainey asserts, that they are composed of striated fibres, and are of the nature of voluntary muscular fibre, and that their function is in some way connected with the act of coition.[1] M. Rau has also published an interesting paper on this subject.[2] He conceives that for two-thirds of their course, these fibres are a continuation of the muscular fibres, both superficial and middle, of the uterus. He admits the correctness of Rosenberger's description of the courses of the three bundles of muscular fibres that form part of the ligament while in the inguinal canal. Some of the fibres proceed to the horizontal ramus and symphysis pubis.

M. Rau thinks that the round ligaments exercise no function during the unimpregnated state of the womb; but, that towards the end of pregnancy, they contribute to give a forward tendency to the fundus uteri, and especially during the early part of labor.

94. The **Ovaries** are the essential organs of generation in the female; they are the "analogues" of the testes in the male, and up to the time of Steno, were called "*testes mulieris.*" They are situated on each side of the uterus, to which they are attached by the posterior duplicature of the broad ligaments, hence called the *ligamentum ovarii.*

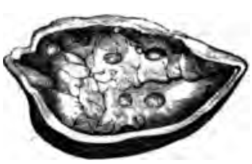
They are small oval flattened bodies, broader at the end distant from the womb; about an inch and a quarter or an inch and a half long, from half to five-eighths of an inch at their greatest breadth, and a quarter of an inch thick. They hang loosely in the pelvis, beneath and somewhat behind the fimbriated extremity of the fallopian tubes. Smooth externally in virgins, they become wrinkled in old age.

Their external covering is the serous membrane, constituting the broad ligament, in which they are completely enveloped, except at the part where the vessels enter.

Underneath the peritoneum they possess a proper fibrous coat of dense structure, called the *Tunica Albuginea.*

95. When laid open, we find their internal structure to consist of cellular tissue, permeated by numerous blood-vessels derived from the spermatic arteries, running tortuously across the ovaries in nearly parallel lines; and by nerves. Embedded in the cellular parenchyma of the organ, in the adult, a number (from 10 to 20) of small vesicles may be observed, which, though noticed by Fallopius and Vesalius, were more particularly described by De Graaf, and called after him, *Graafian Vesicles.*

Fig. 38.



Section of Ovary, Graafian Vesicles.

They vary somewhat in number; and in size, from that of the head of a small pin to that of a small pea.

96. There is some difference of opinion as to the age at which these vesicles are developed: some say, about the period of puberty; others, among whom is Dr. Rigby, state that they make their appearance about the seventh

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[1] Philosophical Transactions. 1850. Part II. p. 515.

[2] Zeitschrift für Geburtshülfe. July, 1851.

year; but according to M. Negrier, in his "*Recherches sur les Ovaires*" they are to be found much earlier. He states that at birth the texture of the ovarian parenchyma is homogeneous, but that in the course of a year, an uncertain number of miliary granulations may be observed; after a short time, these granulations are surrounded by an opaque zone, and a small vesicular globule, whose walls are formed by this zone, is annexed to the granule. This globule contains a vesicle (the Graafian) formed by two membranes, concentric and in contact. At the age of ten or twelve, certain of the vesicles increase in size, and cease to be transparent, because of the interposition between the two membranes of a grey pulpy matter. At the same time, the vesicles go on increasing more rapidly than the cavity in the ovarian tissue in which they are lodged, which gives to them a compressed and slightly corrugated appearance. The grey pulp of the vesicle is gradually changed to a yellow color, marking the epoch of puberty. The vesicles are connected to the part in which they are embedded by cellular filaments, which become weaker in proportion to the age of the child. During early life the vesicles occupy the deeper parts of the ovary, but gradually approach the circumference; and, at the time when the pulp becomes yellow, some of them are in contact with the envelope of the ovary. I have condensed this account from M. Negrier, but am not able to decide upon its correctness.

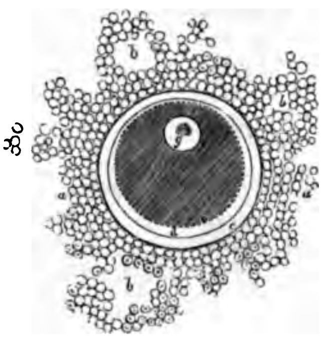
97. So much for the development of the Graafian vesicles: upon their intimate structure very great light has been thrown of late years by the labors of Baer, Rathke, Purkinje, Valentin, Wagner, etc., in Germany; of Prevost, Dumas, Coste, etc., in France; and of Allan Thompson, Wharton Jones, and Martin Barry, etc., in England. From their writings the following description has been gathered, which I believe to be correct, with the exception of a few minor points not yet settled.

The Graafian vesicle consists of an external and an internal membrane: the former (*tunic of the ovisac, Barry*) is extremely vascular; the latter (*ovisac, Barry*) is smooth and velvety, deriving its vessels from the former. The cavity enclosed by these membranes is far from being filled by the ovum; it contains, besides, a whitish or yellowish albuminous mass which consists chiefly of granules, from $\frac{1}{200}$th to $\frac{1}{300}$th part of a line in diameter, connected together by a tenacious fluid, and forming the *tunica granulosa* of Bischoff, Wagner, and Barry. Its density is unequal; towards some part of the periphery of the vesicle these granules are accumulated in a disk-like form, making a slight prominence in which is a depression.

The disk and prominence are termed by Baer the *discus proligerus* and *cumulus*. Dr. Barry has also observed certain granular cords, resembling the chalazæ in the egg in appearance and function, and which he has called the *retinacula*. In the depression in the cumulus is lodged the ovum (*ovulum, Baer*), the discovery of which by Professor v. Baer explained satisfactorily the small size of the ova observed in the fallopian tube by De Graaf, Cruikshank, and Haighton, compared with the Graafian vesicle in the ovary. The ovum is surrounded by a thick white ring, which has been called *zona pellucida*, but which Valentin and Wagner conceive to be a membrane; internal to which we find a granular layer, the *vitellus*, the larger granules of which are superficial and compact, whilst internally it is a clear albuminous fluid, almost devoid of granules.

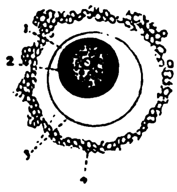
Embedded in this vitellus, but nearer to its circumference than centre is the *germinal vesicle*, or *vesicle of Purkinje*, a very important part of the ovum. It was first discovered in eggs by Purkinje, but in mammalia by Wharton Jones, Coste, Valentin, and Bernhardt. It appears like a clear ring of very small size, measuring in man and mammalia at most $\frac{1}{60}$th part of a line in diameter. Upon the surface of the germinal vesicle a dark spot was discovered by Wagner, and called by him *macula germinativa.* "It is almost always seen as a simple rounded body from $\frac{1}{200}$th to $\frac{1}{300}$th part of a line in diameter; it is very rarely observed double or as an aggregate of granules, which, however, is sometimes the case in immature ova."

Fig. 39.



Ovum of Rabbit.—*aa*. Discus proligerus. *bb*. Pale oil globules. *c*. Zona pellucida. *d*. Vitelline membrane. *e*. Vitellus. *f*. Germinal vesicle. *g*. Germinal spot.

Fig. 40.



Ovum of Man, from Bernhardt.—1. Germinal vesicle. 2. Vitellus. 3. Chorion. (Zona pellucida?) 4. Tunica granulosa.

It may serve to render this minute description more intelligible to the student, if I give the summary of Valentin and Barry of the contents of a Graafian vesicle:

VALENTIN.	BARRY.
1. An external membrane (yolk-bag).	1. Tunic of the ovisac.
2. Fluid contents (yolk).	2. Ovisac.
3. Layer of granules which form the disk (blastoderma).	3. Membrana granulosa, in which are found —
4. Ovum or ovulum, in which is to be distinguished —	4. Tunica granulosa and retinacula (disk and cumulus of Baer).
5. An outer membrane.	5. Zona pellucida.
6. A granular layer, internal to it.	6. Membrana vitelli.
7. A transparent half-fluid content.	7. The yolk.
8. The germinal vesicle	8. Germ vesicle, with Wagner's germinal spot.

Dr. Barry states that the tunic of the ovisac is not always present; but that, when it is, it is furnished by the ovary. The order of time in which the parts are formed is thus given by him:—1, the germinal vesicle with its contents; 2, an envelope consisting of peculiar granules and oil-like globules; 3, the ovisac; 4, the yolk; 5, the membrana vitelli; 6, the zona pellucida; and 7, the tunic of the ovisac, tunica granulosa, retinacula, and membrana granulosa.

98. *Abnormal deviations.* — One or both ovaries may be absent, or atrophied. There may be few or no Graafian vesicles, or they may be morbidly changed. The ovaries may also be the seat of inflammation, dropsy, malignant diseases, etc.

The absence or disorganization of both ovaries, or of all the Graafian vesicles, entails sterility; but conception is not impossible so long as a portion remains healthy.

Having thus minutely investigated the anatomy of the sexual system in the female, we may now proceed to consider its functions.

PART II.

PHYSIOLOGY OF THE ORGANS OF GENERATION.

CHAPTER I.

PHYSIOLOGY OF THE UTERUS AND OVARIES.—1. MENSTRUATION.

99. THE generative organs of the female are in a state of activity only during the prime of life, embracing a period of about thirty years, and during this time, the most remarkable characteristic of their functions is their periodicity.

It is impossible to separate the functions of the uterus from those of the ovary, because in each we may discern their combined influence. Those offices which are peculiarly uterine may thus be enumerated:—1, the secretion of mucus; 2, secretion of the menses; 3, formation of decidua; 4, reception and nutrition of the fœtus; and 5, the expulsion of the fœtus. From the ovary, on the other hand, is derived, 1, the effective stimulus to menstruation, and 2, the fecundated germ; so that we see that the effective co-operation of both the organs is necessary for the fulfilment of either of the three great functions of the uterine system, viz., Menstruation, Conception, and Parturition. We shall consider these functions in order.

100. MENSTRUATION.—In healthy women at the period of puberty a certain amount of sanguineous fluid is eliminated by the uterus, and escapes from the vagina, every month; this is termed the *catamenia* or *menses*, and the function itself, *menstruation*.

That it is excreted by the uterus, has been ascertained in cases of prolapse and inversion of the organ; and that it is really a secretion by its lining membrane, and not blood mechanically filtered through it, is, I believe, now generally admitted.

[It has been shown by the researches of modern physiologists, that the catamenial fluid is ordinary blood mixed with the mucus of the vagina and epithelial cells. Menstruation, therefore, is, strictly speaking, a periodical hemorrhage from the uterus. The doctrine of the secretion of the menses is altogether untenable, and has been given up by nearly all the authoritative writers of a late date on the functions of the female sexual organs. Dr. Dalton, who has examined the subject with great care, remarks that "the menstrual blood is discharged by a kind of capillary hemorrhage, similar to that which takes place from the lungs in cases of hæmoptysis, only less sudden and violent. The blood does not form any visible coagulum, owing to its being gradually exuded from many minute points, and mingled with a large quantity of mucus. . . . The hemorrhage which supplies it comes from the whole extent of the mucous membrane of the body of the uterus, and is, at the same time, the consequence and the natural termination of the periodical congestion of the parts."[1] Madame Boivin expresses a similar opinion. Dr. W. Tyler Smith, in his Manual of Obstetrics (page 57), pronounces the catamenial fluid to be essentially different from the product of any secretory process. The same view is expressed by Professor Meigs, Professor H. Miller, of Louisville, and others of equal eminence.]

A female in whom this discharge recurs *at the usual periods, in the usual quantity*, and of the *usual quality*, is said to be "*regular;*" and various conventional phrases are in use to avoid a more direct reference, as "being regular," "unwell," etc.

101. The occurrence of menstruation defines the period of puberty, at which the girl becomes a woman and capable of conception; as its cessation terminates the prolific period of female life. In Great Britain this generally happens between the ages of thirteen and sixteen, although we meet with cases of earlier and later puberty, dependent, probably, upon peculiarity of constitution, habits of life, pursuits, etc. A case is recorded by Dr. Wall, in the second volume of the Med.-Chir. Trans., of a child who menstruated at nine months old, and continued to do so regularly afterwards. There is another instance in the American Journ. of Med. Science, for Nov. 1832, by Dr. Le Beau, of New Orleans, of a child born with the marks of puberty, in whom the catamenia appeared at three years of age, and recurred regularly. I find also a case by Mr. Embling,[2] of menstruation at less than three years old; one by Dr. Diffenbach[3] at nineteen months old; one by Dr. Catals[4] at six years old; one by Dr. Carus[5] at two years old; one by Mr. Whitmore[6] of a child who menstruated from a few days after birth, till it died at four years of age; one by Dr. Lenz[7] at eighteen months; and one by M. Gruere[8] at one year old. In all these cases menstruation not only commenced at that age, but continued to return at the regular periods. Additional examples may be found in the writings of Lobstein, Meyer, Plocquet, etc., etc.

Mr. Roberton, of Manchester, has stated the age at which it commenced in 450 cases.[9]

10	menstruated	for the first	time at	11	years of age.
19	"	"	"	12	"
53	"	"	"	13	"
85	"	"	"	14	"
97	"	"	"	15	"
76	"	"	"	16	"
57	"		"	17	"
26	"	"	"	18	"
23	"	"	"	19	"
4	"	"	"	20	"

Which gives the mean age 15·204 years.

Mr. Whitehead, in his work On Abortion, gives the following table, showing the age at which puberty was established in 4000 individuals in Manchester:—

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[1] [Human Physiology, Philadelphia, 1859, page 477.]

[2] Lancet, Jan. 29th, 1848.

[3] Meckel's Archiv für Anat., p. 367.

[4] Journal de Méd. et de Chir., vol. ii., p. 87.

[5] Ed. Monthly Journal, 1842, p. 1050.

[6] Northern Journal of Med., July, 1845.

[7] Caspar's Wochenschrift., Oct. 3, 1840.

[8] Journ. de Méd. et de Chir. Pratique, May, 1842.

[9] Physiology and Diseases of Women, and Midwifery, p. 29.

At the age of	10	years	9	first menstruated.
"	11	"	26	"
"	12	"	136	"
"	13	"	332	"
"	14	"	638	"
"	15	"	761	"
"	16	"	967	"
"	17	"	499	"
"	18	"	393	"
"	19	"	148	"
"	20	"	71	"
"	21	"	9	"
"	22	"	6	"
"	23	"	2	"
"	24	"	1	"
"	25	"	1	"
"	26	"	1	"

These tables seem to bear out the inference of Mr. Roberton, that the "natural period of puberty, instead of being the fourteenth or fifteenth year, occurs in a more extended range of ages, and is more equally distributed throughout that range than authors have alleged." It is influenced, however, by many causes; for example, it is earlier in towns than in the country, for M. Brierre de Boismont found the mean age of first menstruation to be fourteen years six months in Paris, and fourteen years ten months in the country, and fourteen years nine months in small towns.

[*M. Brierre de Boismont*, in his work, "*De la Menstruation considerée dans ses Rapports Physiologiques et Pathologiques*," among a mass of interesting facts, gives the following curious table of ages at which menstruation commences. It is the most extensive table yet published, and includes the results of 2352 cases: —

Age.	Paris, 1200 cases by Meniers.	Paris, 85 cases by Marc D'Espine.	Lyons, 432 cases by Petrequin.	Marseilles, 68 cases by Marc D'Espine.	Manchester, 450 cases by Roberton.	Gottingen, 137 cases by Osiander.
5	1	0	0		0	0
7	1	0	0	0	0	0
8	2	0	0	0	0	0
9	10	1	0	0	0	0
10	29	0	5	0	0	0
11	93	3	14	6	10	3
12	105	14	26	10	19	1
13	132	6	47	13	53	0
14	194	18	50	9	85	20
15	190	14	70	16	97	32
16	141	7	79	8	76	24
17	127	6	58	4	57	11
18	90	5	38	2	26	18
19	85	8	21	0	23	10
20	30	3	9	0	4	8
21	8	0	5	0	0	1
22	8	0	1	0	0	0
23	4	0	0	0	0	1
24	0	0	3	0	0	0

This table demonstrates that by far the greater number of women begin to menstruate during their 14th or 15th year, and that the proportion diminishes both above and under that age.[1]

A very interesting case by Dr. Carus, of Dresden, is mentioned in the recent medical journals, of a child born in the mountains of Saxony, in whom menstruation began at two years of age.

"She was scarcely a year old, when she began to grow rapidly. At the end of her second twelvemonth, the catamenia appeared, and have continued ever since to flow regularly once a month. The Academy of Medicine of Dresden sent for both her and her mother, and, in order to examine more particularly into the case, kept them under their observation during several weeks. The infant was 37 inches 3 lines long. The mammæ were firm, like those of a strong girl of 16. Her body was stoutly made, and the genital organs were covered with dark brown hair. Her physiognomy and tone of voice were childish, which contrasted singularly with the strength of her body. Her intellectual functions were equal to those of a child three years old, and her head was covered with beautiful dark brown hair."[2]]

Again, the rank of life and degree of civilization exert an influence, for the same writer states that he found the mean age in 171 of the poor to be fourteen years ten months; in 135 of the comfortable working-classes to be fourteen years five months; and in 53 daughters of the rich and noble, thirteen years eight months.

By most writers, a very great effect is attributed to climate. Menstruation, it is said, commences much earlier than the period I have named in hot climates, and much later in cold ones. Women are stated to be mothers very commonly at ten or twelve years old in the East, and to cease bearing at twenty-five or thirty; and that in Lapland, and other northern climes, they do not begin to menstruate till about twenty or twenty-four, and continue until sixty years of age. Now, without denying the occurrence of such cases, I do not believe that either extreme is very common, and although there is a difference according to climate, that difference is far less than has been supposed.

Thus Mr. Roberton, in his valuable researches, gives it as the result, that in Labrador and Northern Europe, the period of first menstruation is very nearly the same as in this country, nor does the discharge continue later;[3] whilst in India, although the average age, in his return, is earlier, it is probable that puberty does not actually appear earlier there than here.[4]

Dr. Tilt, who has published a valuable table on this subject, finds the mean age for the first menstruation in hot climates, out of 629 cases, to be thirteen years and sixteen days; out of 5775 cases, in temperate climates, fourteen years, four months, and four days; out of 4018 cases, in cold climates, fifteen years, ten months, and five days.[5]

102. In these countries the discharge continues until the age of forty-five or fifty; in some cases it ceases earlier, in others it continues longer; generally according to the age at which it commenced. From Mr. Roberton's work I extract the periods at which it ceased in 77 individuals:[6]

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[1] [Edinb. Med. and Surg. Journ., Jan. 1843.]

[2] [American Journ. Med. Sciences, April, 1843, from Allgemeine Zeit. für Chirurgie.]

[3] Physiology and Diseases of Women, etc., p. 56.

[4] Ibid, p. 127.

[5] Edinburgh Monthly Journal of Med. Science, Oct., 1850, p. 294.

[6] Phys. and Dis. of Women, and Mid., p. 185.

In 1	at the age of	35	In 26	at the age of	50
4	"	40	2	"	51
1	"	42	7	"	52
1	"	43	2	"	53
3	"	44	2	"	54
4	"	45	1	"	57
3	"	47	2	"	60
10	"	48	1	"	70
7	"	49			

The period of its cessation is called by women the "*time, or turn of life;*" and is preceded by irregularity and occasional interruption. It is looked upon as a critical period, from the supposed liability to serious attacks and the greater mortality; but the researches of MM. Benoiston de Chateauneuf, Bellefroid, etc., have shown that the mortality at this period of female life is not greater than amongst males at the same age.

103. As the name (*menses, catamenia*) implies, the discharge recurs every month; that is, deducting four or six days for the time of its flow, every twenty-seven or twenty-eight days. Mr. Roberton found that, out of 100 women, 61 menstruated every month, 28 every three weeks, 10 at uncertain intervals, and one, a healthy woman, æt. twenty-three, every fortnight. The shortening of the interval of twenty-six or twenty-eight days is a deviation from functional integrity, owing, most likely, to habits of life, impaired constitution, etc. Dr. Gall made some very curious observations, from a journal which he kept of the periods of menstruation in different women: "It resulted" (I quote from Elliotson's Physiology, not having the original at hand) "that women are divided into two great classes, each having a different period. The women of the same class all menstruate within eight days: after this time an interval of ten or twelve days follows, during which very few women menstruate. At the end of the ten or twelve days begins the period of the second great class, all the individuals of which also menstruate within eight days." Admitting exceptions to the rule, Dr. Gall says that it applies generally to all parts of Europe.

104. The duration of each menstrual period varies from three to six days, or even longer. The quantity which escapes each time is from four to eight ounces, varying according to the temperament or constitution of the individual. It is not discharged at once, but slowly and gradually. As to the character of the secretion, it greatly resembles venous blood, being of a dark-red color, thin, and either without odor, or with a very faint one. It consists at first of pure blood, but in its passage through the vagina its fibrine is probably dissolved by the acid secretions of that part. It is found to redden litmus paper, and to contain phosphoric and lactic acids, with some phosphate of lime.

105. The *symptoms* which precede and accompany the first menstruation are very slight in some cases, well-marked in others. There is generally a degree of languor and lassitude, fatigue after exertion, inequality of spirits, dark shade under the eyes, headache, sometimes pain in the thyroid gland, pain in the back, weight and aching in the pelvis and down the thighs, etc.: occasionally there is a smart attack of fever.

If the discharge takes place, most of these symptoms disappear, and the female merely complains of weakness, and exhibits pallor of countenance.

Or the menstrual secretion may make its appearance quite suddenly, without any previous suffering or any symptom likely to attract attention, and in such cases it is a cause of considerable alarm, and it may be that steps are taken to suppress it by the girl herself, which may be very injurious.

Or the symptoms enumerated may occur, and pass off once or twice without the appearance of the menses, or *with a white discharge only.* This may generally be remedied by an improvement in diet and tonics at the approach of the next menstrual period.

Sometimes the color of the discharge is light at first, growing deeper each period. During its flow, the skin exhales a peculiar odor, the appetite is diminished, and often capricious, and occasionally sympathetic pains are felt in the breasts. There is a case[1] related of a woman whose breasts secreted milk after each menstrual period, and I have myself seen a similar case. The amount of suffering differs, as I have said, in different women, according to some peculiarity of constitution, and according to the degree of care and good management bestowed upon them during the earlier periods. In some it is never attended by pain or distress, beyond a slight indisposition to exertion; in others, more or less pain and uneasiness attend each period, whilst in some women it always amounts to dysmenorrhœa, and is accompanied with great suffering, debility, or feverishness. I may add that the first menstruation is not necessarily a type of the subsequent periods. The more perfectly the function is performed the less is the distress.

106. The effects of the development of this function upon the body and mind of a young girl are very striking. The figure enlarges, becomes rounder and more fully formed, the pelvis expands, the mammæ enlarge, and the general bearing becomes graceful and dignified. The mental change is as remarkable: the pursuits of girlhood are exchanged for more womanly interests; and a more exquisite perception of her position and relations results in higher enjoyment, veiled by a more delicate modesty. These changes are rapid, and, occurring at this peculiar period, doubtless fit the individual for the more perfect fulfilment of the duties about to devolve upon her.

107. From the importance of this function, a few brief directions as to the management of young girls at its commencement will not be out of place. And first, I would protest against the demand not unfrequently made upon us, that at the usual age we should endeavor to bring on menstruation in cases in which it has not appeared. The intimate dependence of this function on the general development of the body ensures its establishment at the proper time in the majority of cases, and in those where it is tardy it most frequently arises from causes over which we have no immediate control, and to attempt to interfere will probably end in mischief. The cases suitable for our medical interference we shall enumerate by-and-bye.

I do not think that girls should be instructed beforehand as to the occurrence of this discharge, or certainly, if it be done, it should be in the most general manner; but I think we may safely leave this to the watchful care of the mother.

Warm clothing and rest are very necessary. The custom of wearing drawers, which is becoming general, will, I have no doubt, contribute to the more perfect performance of this function, and to the health of young women generally.

During menstrual periods, especially the earlier ones, the girl should be much restricted in her exercise, and be prevented from violent or rapid movements. And especially she should guard against cold. Exposure to cold air, too liberal use of cold water in washing, bathing the feet in cold water if it be summer, may inflict permanent injury.

During the intervals, the girl may resume her ordinary habits; and whatever is calculated to strengthen the constitution, and to improve the general health, such as fresh air, exercise, bathing, and good diet, will also tend to render complete and permanent the healthy performance of this function.

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[1] British and Foreign Med. Review, Oct. 1840.

This is scarcely the place to indicate the moral management of young girls, but I may just mention that, as this is the most susceptible age for receiving impressions, it is desirable that they should be of a healthy kind; that as all such as enervate, all those which appeal to the imagination—novels and poetry, which make life a dream of idle fancy or of affection unconnected with duty—should be controlled, if not avoided. As the girl is becoming a woman she should be treated as such, and true views of life and duty, as well as of pleasure, be laid before her. Late hours, excitement, balls, exhibitions, etc., should be made the exception, not the rule, remembering always, that while softness, and affection, and grace, are the natural attributes of woman, it is the province of a wise educator to instil principles, and strength, and practical wisdom.

108. The next very important question is the *condition of the organs during menstruation*. By a great number of writers the attention has been limited to the uterus, which, being the seat, was regarded as the chief, if not the sole organ involved. Upon careful investigation, we find that the *uterus* is congested during menstruation; its vessels are distended with blood, its substance more flaccid than usual, of a more decided pink color, and its lining membrane of a deep red, studded with bloody points, and covered with menstrual fluid. The cervix, however, participates but slightly in the increased vascularity, and its lining membrane is scarcely altered in color, so that the *os uteri internum* is marked by the abrupt termination of the dark color of the lining membrane of the body. On making a vaginal examination, we find the cervix softer, more puffy, and slightly swollen, and the os uteri more open, than at other times. The *fallopian tubes* are also somewhat more vascular than usual.

A very careful examination was made by Dr. Janser of the organs of generation of a girl who was murdered four days after menstruation, and he thus describes the state of the uterine mucous membrane: "It was much swollen between the body and neck. In the uterus itself it formed a velvety membrane, glossy and brilliant, easily detached with the handle of the scalpel, and presenting a fine network of vessels. This mucous membrane was evidently thickened: it was composed of the uterine glands, ranged perpendicularly alongside each other, and fitted with cylinder epithelium not ciliated. The structure between the uterine glands was composed of a network of delicate fibres, of some nucleated cellular fibres, and of amorphous tissues. The surface of the uterus was covered with a thin layer of mucus, and lined with cylindrical epithelium, without cilia. The orifices of the fallopian tubes were open. The vaginal mucous membrane was pale, but was only covered with a thin layer of mucus, containing epithelial cells." The writer adds, "It results from this observation that the mucous membrane of the uterus presents, during menstruation, characters analogous to those which exist during gestation, such as the hypertrophy of the uterine follicles, and the disappearance of vibratile cilia."[1]

M. Pouchet conceives that not only does this peculiar change in the mucous membrane take place, but that a deciduous membrane is formed and discharged each month. Dr. Lee believes it to be a frequent occurrence with unmarried females; Dr. J. C. Dalton thinks its periodical occurrence very probable. Professor Bischoff's examinations did not confirm this opinion. Dr. Tyler Smith and others believe that the mucous membrane is exfoliated every month.

These changes rapidly subside when the function ceases, and the parts return to their ordinary state.

109. A still more essential question, however, is the state of the ovaries,

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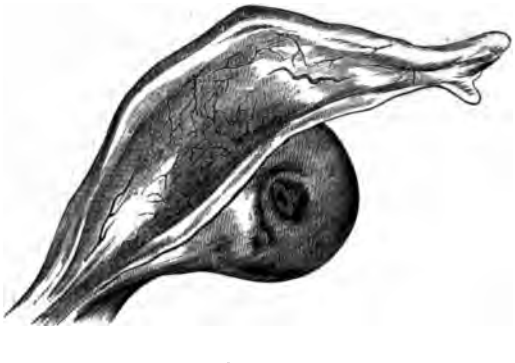
[1] Med. Annals. vol. xiii. part iv. Lond. Journal of Med., April, 1850.

and the influence they exert upon menstruation. From time to time it has been suggested that these organs were of greater importance to this function than was generally admitted, or even of equal importance to the uterus itself. A reference of this kind is made by Dr. Friend, in his "Emmenologia;" and Dr. Power goes further, and attributes menstruation entirely to the action of the ovaries: Dr. Vaughan also regarded the menses as a secretion dependent upon the ovaries; and other authorities might be adduced. Indeed, there are certain facts which cannot but lead to an admission of a certain influence exerted over menstruation by these organs: for instance, it is well known that they participate in the congestion which is observed in the uterus at the monthly periods; again, when the ovaries have both been atrophied or diseased, as noticed by Morgagni and Frank; or when one was congenitally absent and the other disorganized, as in a case related to me by my friend Dr. Montgomery, the secretion of the menses has been prevented altogether, or it has ceased prematurely. Moreover, when the uterus is absent but the ovaries present, the menstrual *molimen* and other sexual peculiarities are observed. Lastly, when the ovaries have been removed, as in the case mentioned by Mr. Pott, menstruation ceased entirely.

These considerations alone would, I think, be sufficient to justify the opinion that, although the uterus be the seat, and its lining membrane the secreting agent in the process, yet that the impulse or stimulus upon which the function depends is in some way or other derived from the ovaries.

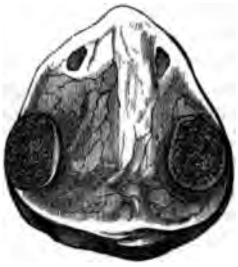
Nor is this inference weakened by the changes which are observed in the ovaries during menstruation, which may throw some light also as to the nature of the stimulus. For almost all the accurate information we possess, we are indebted to the recent researches of Drs. Girdwood, Lee, Ritchie, Knox, Renaud, Dalton, etc., in this country and America, and Pouchet, Negrier, Gendrin, Bishoff, Raciborski, Chereau,[1] etc., on the Continent, although the main fact established by their labors was curiously noticed by Mr. Cruikshank so long as 1797: "I have also," he says, "in my possession the uterus and ovaria of a young woman, who died with the menses upon her. The external membranes of the ovary were burst at one place, from whence I suspect an ovum escaped, descended through the tube to the uterus, and was washed off by the menstrual blood." Several similar observations have been published by Dr. Lee in the Cyclop. of Pract. Medicine, and

Fig. 41.



Ovary at Menstrual Period.

Fig. 42.



Ovary at Menstrual Period.

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[1] See Müller's Physiology: Supplement, p. 45, et seq.

since in the Med.-Chir. Transactions; Mr. Girdwood and M. Gendrin have each added five cases, and M. Negrier five more, of the same kind. All the observations agree that, in females dying during or soon after menstruation, a small irregular rupture or cicatrix was found in the coats of the ovarium (fig. 41), and that this communicated with the remains of one of the Graafian vesicles; from which Dr. Lee concludes that it is "extremely probable that all the phenomena of menstruation depend upon, or are connected with, some peculiar changes in the Graafian vesicles, in consequence of which an opening is formed in the peritoneal and proper coats. Whether an entire vesicle, or only the fluid it contains, escapes through this opening at the period of menstruation, further observations may hereafter determine."

The changes which take place in the vesicle are thus stated by M. Negrier: an afflux of transparent fluid occurs in the vesicles, distending and ultimately causing its rupture at the least resisting part, which corresponds to the surface of the ovary. This opening is cicatrised, at least externally, in about eight or ten days, so as to prevent the escape of the blood which proceeds from the lacerated vessels of the vesicle, and, in consequence, a clot is frequently formed in the capsule of the vesicle (fig. 42). Sometimes it contains a serous fluid, colorless, or tinged with blood.

A very valuable prize essay on the subject has lately been published by Dr. J. C. Dalton,[1] in which he records eleven cases in which he observed these menstrual corpora lutea, and gives very minutely the changes which take place in them. He thinks the exact period of the menstrual flow, at which the vesicles rupture, variable: sometimes during the flow, in other cases — as stated by Bischoff, Pouchet, and Raciborski — at the termination. The appearance of the corpus luteum will depend upon the extent of the rupture, and the amount of hæmorrhage into the cavity. "As to the seat of the peculiar growth which characterizes these bodies," he considers it to be the proper membrane of the vesicle hypertrophied, and that the proligerous disc, and a considerable portion of the membrana granulosa are expelled with the ovum. "The new growth or deposit of yellow matter, when examined under the microscope, is seen to consist of an abundance of peculiar, irregular-shaped granular cells, varying in size, and sometimes enclosing minute, opaline, yellowish globules, like oil. The contour of the cell wall can in most instances be completely traced throughout; but in some instances it is indistinct in certain parts of the circumference. There are also to be seen in the field of the microscope a few oil globules similar to those in the interior of the cells, but for the most part of larger size." Recent researches seem to show that the development of fatty matter is an early step in the death and removal of tissues; and it is possible that a similar step may thus be observed in these menstrual corpora lutea, for we find them attain their maximum in the course of three weeks, then rapidly retrograde until the yellow matter diminishes in size, becomes softer and more friable, and at length merely exhibits a cicatrix, with a small, faint yellow spot. Dr. Dalton agrees with those already mentioned, who regard the discharge of ova as an essential part of menstruation.

I may add here the examination of the ovary in the case related by Dr. Janser, to which I have already referred. "The surface of the left ovary presented a deep red spot, surrounded by finely injected vessels. This spot was formed by a small globular mass, embedded in the ovary, and of an intense red through its whole thickness. The mass in question was separated from the tissue of the ovary by a thin yellow envelope, and was composed of fibres like those of areolar tissue, arranged in superimposed layers. The yellow envelope was formed by the same kind of fibres, among which there was a pretty considerable quantity of fat, not contained in cells. Near this body, there was seen a small yellow, spherical, nodulated mass, composed of areolar tissue and fat. The right ovary contained two yellow bodies."[1] No ovule was found; but the examination was four or five days after menstruation.

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[1] On the Corpus Luteum of Menstruation and Pregnancy, p. 45. [See also Treatise on Human Physiology, by the same author, pp. 478, et seq.]

M. Bischoff has published the minute examination of thirteen cases, in which the clot was found in the place of the discharged ovum, the rent in the coats, cicatrices, and marks of former ova, congestion of the uterine mucous membrane, but neither decidua nor ovule. There are but two or three cases (by Hyrtl and Letheby) in which the ovum has been found.

If the reader will carefully compare the cases here quoted, and those recorded by the authors mentioned, but which it would be out of place to detail more fully here, he will agree with me, I think, that they justify the following conclusions: —

1. That ovarian influence is necessary to menstruation: *a.* because when the ovaries are congenitally absent, or have been removed, or have become disorganized, menstruation is absent or ceases. *b.* Because when the uterus is absent or has been removed, the ovaries being present, the menstrual molimen may still recur periodically.' *c.* Because coincident with the commencement and cessation of menstruation we find corresponding organic changes in the ovaries.

2. We find that the ovaries do not contain a definite and limited number of Graafian vesicles, as Haller and others have thought, but a vast assemblage, according to the researches of Dr. Martin Barry, and the number of which vesicles may be increased, according to Dr. Ritchie.

3. In the ovaries of women who menstruate regularly, there may be observed a number of the Graafian vesicles, in different degrees of development, from the size of a millet seed to that of a cherry stone.

4. There are cases on record of women who died just before menstruating, in one of whose ovaries a vesicle was observed in a state of great maturity, enlarged and prominent, with its outer coverings much thinned, semi-transparent, and in one point apparently about to burst.

5. In a considerable number of cases of death during menstruation, one ovary presented a cavity recently emptied, or partially filled by a clot, from which a duct-like canal passed through the coats of the ovary. That this cavity contained a Graafian vesicle cannot reasonably be doubted.

6. On examining the ovaries, a number of cicatrices may be observed, some more, some less recent; and in several cases these have been ascertained to correspond exactly with the number of the menstrual periods. According to Mr. Girdwood's researches, this is always the case.

7. These cicatrices, when cut open, exhibit the yellow spots, which result from an hypertrophied condition of the proper membrane of the Graafian vesicle. These *menstrual corpora lutea* have given rise to much controversy as to their difference from, or relation to, the *corpora lutea of pregnancy*, of which I shall have more to say presently.

8. Cases are on record in which (according to Dr. Ritchie) menstruation has taken place without the escape of a vesicle, and others, also, in which there was evidence of the escape of a vesicle previous to menstruation. This latter case has occurred more frequently than the former (and answers to those cases in which conception has preceded menstruation, or occurred during lactation), but both are so rare as scarcely, if at all, to affect the question.

9. This view is further supported by the analogy of other mammalia, as

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[1] London Journal of Med., April, 1850.

both Bischoff and Raciborski have shown in the case of the bitch; so much so that the former accurate observer lays down the law as equally applicable, that "the ova formed in the ovaries of females of the human species and of mammiferous animals, undergo a periodical maturation quite independent of the influence of the male seminal fluid."[1]

The conclusions which have been so ably put forth by M. Pouchet are as follows: "1. That in all classes of mammalia ova are produced spontaneously in the ovaries. 2. That they are expelled spontaneously at regular intervals, independently of coition. 3. That in the human female they are so expelled at each menstrual period, this period corresponding to the rutting season of animals. 4. That the ova are, and can be, fecundated only after their expulsion from the ovary; the various solid membranes by which they are protected previous to this expulsion opposing a complete obstacle to the access of the spermatic corpuscles, the actual contact of which is indispensable to the impregnation of the ovum. 5. That in all probability the part where fecundation usually takes place, is the cavity of the uterus, or the lower part of the fallopian tube."[2] With these views Bischoff, Raciborski, and others agree; but although there is a great body of evidence in support of this view, it may be doubted whether it is as yet sufficient to warrant such positive deductions.

Professor Müller's opinion, which is more cautiously expressed, is perhaps more strictly in accordance with the present state of our knowledge. He observes that "the number of facts at present collected are insufficient to establish it as a *law*, that an ovum is discharged from the ovary of the human female at *every normally developed period of menstruation*. Yet it must be observed, that although the diseases causing death must, in the majority of instances, disturb the function of the ovaries, and prevent the extrusion of the ovum, yet to each of those inquirers who have been on the watch for such cases, several instances of ruptured follicles in menstruating women have occurred within a short space of time. And the fact that the ovaries of the human female become turgid and vascular at the menstrual periods, as those of animals do at the time of heat, strongly favors the opinion that the generative system of the human female is subject to the almost universal law of the periodical discharge of ova."[3]

110. The *final cause* of menstruation is said to be, 1, To get rid of the surplus blood employed during gestation in the nutrition of the fœtus, but which in the unimpregnated state might be injurious; and, 2, To prepare the uterus for impregnation and conception. The first is a mere hypothesis grounded on an assumption, for it is not proved that there is any surplus blood when the female is not pregnant; I need, therefore, say no more about it.

As to the second theory, it is based upon the observation, that conception seldom or never takes place before the period of the first menstruation, or puberty; that it does not occur in those who do not menstruate, or after the cessation of menstruation; and that calculations show that it takes place more readily soon after a menstrual period. This latter is a very old observation, and is held by most modern obstetricians. Naegelè, for instance, calculates the duration of pregnancy at nine months and eight days from the last menstrual period, and in normal cases he says he has never been wrong. The popular mode of calculation is pretty much the same.

[As regards the coincidence of menstruation and conception we have conflicting testimony. The late Dr. Dewees, whose experience was very extensive, wrote as follows: "The final cause of the menses is perhaps enveloped in some obscurity; but of this we know at least one incontrovertible fact, namely, that the healthy performance of this function is in some way or other connected with the capacity for impregnation; as *no well-attested instance is upon record, where this has taken place in a female who never had had this discharge*, or even when it was not of a healthy character, and with a greater or less degree of regularity." In these remarks we must understand Dr. Dewees as merely asserting his own experience, for the experience of numerous equally competent observers is in direct opposition. The regular and healthy performance of the menstrual function is certainly indicative of a natural condition of the female genital organs, and of the consequent aptitude of the individual for impregnation; yet it is not always so; every healthy menstruating female is not fruitful; and I have known many instances where women bore children regularly, although the menstrual office was neither regularly nor healthfully performed. Professor Dunglison well observes: "As a general rule, the appearance of the menses denotes the capability of being impregnated, and their cessation the loss of such capability. Yet, females have become mothers without ever having menstruated. Foderé attended a woman who had menstruated but once—in her seventeenth year, although thirty-five years of age, healthy, and the mother of five children. Morgagni instances a mother and daughter, both of whom were mothers before they menstruated. Sir E. Home mentions the case of a young woman, who was married before she was seventeen, and having never menstruated, became pregnant; four months after her delivery, she became pregnant again; and four months after the second delivery, she was a third time pregnant, but miscarried. After this she menstruated for the first time, and continued to do so for several periods, when she again became pregnant; and Mr. Harrison, at a meeting of the Westminster Medical Society, remarked, that he knew an instance in which the mother of a large family had never menstruated.[1] Such instances prove that ova are maturated without the ordinary recurrence of a sanguineous exhalation from the lining membrane of the womb."

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[1] Müller's Physiology: Supplement, p. 45.

[2] Théorie Positive de la Fécondation.

[3] Physiology: Supplement, p. 50.

"The menstrual flow," remarks Dr. Dalton,[2] "is, in fact, only the external sign and accompaniment of a more important process taking place within. It is habitually scanty in some individuals, and abundant in others. Such variations depend upon the condition of vascular activity of the system at large, or of the uterine organs in particular; and though the bloody discharge is usually an index of the general aptitude of these organs for successful impregnation, it is not an absolute or necessary requisite. Provided a mature egg be discharged from the ovary at the appointed period, menstruation, properly speaking, exists, and pregnancy is possible."

The modern ovular doctrine of menstruation is unquestionably encompassed with some difficulties: these have caused it by a few to be considered rather as "a plausible and ingenious hypothesis, than as a well-established theory." Mr. Kester[3] thinks that "the actual state of our knowledge of the nature of menstruation may be expressed in the following propositions:—

"1 Menstruation is a *periodical* function of the uterus.

"2. Ovulation is the *constant* function of the ovaries.

"3. Ova are matured in the ovaries at all ages, but more rapidly during menstrual life.

"4. Ova are discharged at all periods of female life, in the intervals of, as well as at the time of, menstruation.

"5. Ovulation and menstruation being often concurrent, indicate that they are both the result of the attainment of a certain point in the development of the female economy.

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[1] [Human Physiology, 4th edition, vol. ii. p. 357.

[2] Human Physiology, p. 476.]

[3] [London Medical Gazette, Nov. 1849.]

"6. The law of periodicity in the one not obtaining in the other, leaves still wanting the inseparable link in the chain of causation whereby menstruation can be shown to be the effect of ovulation.

"7. At the menstrual period, the ovaries experience an extension of the uterine congestion, and become, equally with the uterus, the seat of increased functional activity.

"8. The menstrual flow is a true hæmorrhage, as shown by chemical analysis, and by the phenomena of disease."]

M. Bischoff thus expresses himself: "At certain periods, known as those of 'heat' or 'the rut' in animals, and 'menstruation' in the human female, the ova which have become mature disengage themselves from the ovary, and are extruded. Sexual desire manifests itself in the human female with greater intensity at these periods, and in the females of mammiferous animals at no other time. If the union of the sexes takes place, the ovum is fecundated by the direct action of the semen upon it. If no union of the sexes occur, the ovum is nevertheless extruded from the ovary, and enters the fallopian tubes, but there perishes."

I may here remark, 1, That if this view be strictly correct, conception could scarcely occur previous to the appearance of the menses, or without their reappearance; and yet both cases do occur, and the latter not very rarely. 2, That the discharge of the ovum must necessarily be about the termination of menstruation, or it would escape with that excretion. 3, That conception must take place within a few days of that period, or the ovum would escape, and only during that short space, because afterwards there would be no vesicle to be fecundated. How long this period may be it is difficult to say; but it would be difficult to reconcile this view with the cases which occur, of impregnation taking place ten, twelve, or twenty days after the cessation of the menstrual period,[1] which are not uncommon. Jewish females are required to abstain from intercourse for five days before and seven days after menstruation, and yet they are very fruitful; and Hirscher mentions a case of conception, where he ascertained that impregnation occurred twenty-two days after healthy menstruation. If we calculate the period of pregnancy according to Naegelè, or allow a few days more (reckoning from the mid-period, in the popular mode), my own experience, and that of others, would show that more women overrun than anticipate the nine months. I cannot think that the period for conception is so limited as these opinions, if correct, would require; neither am I sure that there is an increase of sexual desire at the menstrual period.

111. Dr. F. H. Ramsbotham has lately put forth his views of the final cause of menstruation, which I think it right to lay before the reader. He conceives that the function of menstrution is "identical with the nutrition of the young ovum, and that the menstrual discharge indeed is nothing less than the rudiments of the deciduous membrane itself; or rather that it would have become the deciduous membrane, provided conception had occurred:" and he explains the process more fully thus,—"An ovule ripe for impregnation parts from the nest in which it had been elaborated, being conveyed by the grasp of the fallopian fimbriæ. At the same time Nature establishes an action for the purpose of preserving it, provided an opportunity of becoming impregnated by contact with the male semen is afforded it. Should that contact take place, and conception follow, the fluid formed is retained within the uterus, and is gradually converted into the deciduous membrane, which becomes the first medium of communication between the newly animated

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[1] Oldham: Med. Gaz., July 13th, 1849.

ovum and the maternal vessels. If, on the contrary, conception does not happen, the ovule perishes, and the fluid secreted for its advantage not being required, is allowed to exude externally, as a superabundant and useless excretion."[1]

The first difficulty involved by this view is the limitation of the period of impregnation, which hardly corresponds with the latitude allowed, so far as we can infer from the period of delivery. This, Dr. R. thinks, may be explained by the impregnation taking place either in the ovary or fallopian tube, and the additional time required for the descent of the ovum.

In a subsequent communication, Dr. Ramsbotham widens his theory a little, by supposing that the ovum may "part from its previous connections some days before the menstrual fluid is secreted," and so be liable to impregnation; and, on the other hand, that the ovum may be retained after the escape of the catamenia; and that if within a certain period it be impregnated, the uterus may then take on new action, and form a fresh secretion, which is converted into decidua.

This extension of the period of conception, to a certain extent removes a second objection, viz., that we can hardly suppose impregnation to occur after the commencement of the menstrual secretion, because of the impediment that would be to the ascent of the spermatozoa, and because separation of the sexes is almost universal during these periods, unless we suppose also that the menses are retained in utero after secretion, of which we have no evidence.

I must add, as a third objection, that I cannot think that we have any adequate proof that the menstrual secretions can be converted into the decidua, considering the difference in their elementary constituents. That the same condition of the organ may, under a different stimulus, secrete *either* the one or the other, according to the peculiar stimulus, I can easily understand, but that does not seem to be Dr. Ramsbotham's view.

Lastly, this theory seems hardly consistent with the laws of menstruation, when the fallopian tubes are impervious, or with cases of extra-uterine fœtation in which a deciduous membrane is found.

Having noticed these different theories, I think it will be the wiser plan to put forward no theory of my own. Our knowledge is at present very deficient, but the inquiries recently set on foot may perhaps result in a more perfect acquaintance with these important processes and their various relations.

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[1] Med. Times and Gazette, Jan. 17th, 1852, p. 57. Some interesting correspondence upon this subject will be found in the same journal for Jan. 24th, p. 92; Jan. 31st, p. 115; March 20th, p. 229; March 27th, p. 325, of the same year.

CHAPTER II.

DISORDERS OF MENSTRUATION.

112. THESE functional derangements are divided into three classes: 1. Amenorrhœa; 2. Dysmenorrhœa, or difficult menstruation; and 3. Menorrhagia, or excessive menstruation. Each will require a separate, though brief notice.[1]

113. I. AMENORRHŒA may be divided into two classes: *emansio mensium*, when the menses have never appeared; and *suppressio mensium*, when, having been regular, they are obstructed. In considering absent menstruation as a disease, the reader will bear in mind the difference of age at which the catamenia appear, as it is not intended to include late menstruation as such, in the present class.

114. *Emansio Mensium.*—Menstruation may be absent from *congenital malformation.* The ovaries may be wanting, or, if present, they may be atrophied or diseased; the vesicles may be diseased or absent. But, although the ovaries be well developed, other organic irregularities may prohibit the periodic evacuation; for example, the uterus may be absent, or incompletely developed; the canal of the cervix may be closed, the os uteri impervious: the vagina absent, its sides adherent, or its orifice closed by adhesion, false membrane, or an imperforate hymen.

When the defect is ovarian, we find no effort at menstruation at all; the body is generally pretty well developed, and its functions (except the one) tolerably correct, but the sexual characteristics are wanting. When the uterus is absent or defective, on the contrary, these sexual peculiarities are observed, and there is an effort at menstruation every month, but of course no discharge. There is a considerable difference, however, when the passage merely is obstructed; then the menses may be secreted, and retained in the cavity of the uterus or vagina, until, from over-distension, the parietes give way.

115. The *diagnosis* will depend upon these peculiarities, and the *treatment* must be adapted accordingly. Nothing effectual can be done if the uterus or ovaries be absent; but, in occlusion of the os uteri or vagina, an effort must be made to remove the obstacle. The os uteri, or canal of the cervix, may be pierced by a pointed probe, a trocar, or an instrument like that used by Mr. Stafford for strictures of the urethra. An artificial vaginal canal may be formed by the knife, or by forcibly separating the parietes. Occlusion of the vaginal orifice may be remedied by the knife or trocar. Great care will be required after any of these operations: leeches, cold lotions, fomentations, or poultices may be necessary. A piece of lint, spread with simple cerate, should be introduced into the opening to prevent the formation of new adhesions.

116. *Simple Amenorrhœa* is the name given to those cases where the sexual system is developed, the signs of puberty present, but where no discharge at all escapes from the vagina. The subjects of this disease may be of robust habit of body, or weak, pale, and delicate. In the former, the constitutional suffering is more severe, with some febrile action, flushed face, headache, full pulse, etc. In the latter, the sympathies of distant organs are

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[1] For fuller details concerning these disorders, I beg to refer my readers to my volume on Diseases of Women.

manifested more slowly, and there is little, if any, febrile action. They appear, in fact, something like the acute and chronic stages of other diseases. In either, an attempt at menstruation may be made every month, accompanied by rigors, pain in the back and loins, weight at the lower part of the abdomen, aching along the thighs, general lassitude and uneasiness, etc., etc., without any discharge. But, though these symptoms pass away, another series arises: the patient complains of frequent headache, sometimes with intolerance of light and sound, throbbing, and a sense of fulness in the head, pain in the side or back; the stomach and bowels become irregular, the countenance pale, and the strength reduced. Paroxysms of dyspnœa and hysteria may also occur, and the patient acquires the appearance of confirmed ill-health. Of course these symptoms will differ in different constitutions; and cases occur occasionally in which a long continuance of amenorrhœa has but slightly disturbed the general health.

A vaginal examination with the finger or bougie affords no information in these cases.

The *causes* of this variety, says Dr. Locock, "are generally to be found in the previous habits of the patient; for it is most frequently met with in those who have led sedentary and indolent lives, who have indulged in luxurious and gross diet, and been accustomed to hot rooms, soft beds, and too much sleep."

The *proximate* cause is probably some peculiar condition of the ovary in the majority of cases.

The *diagnosis* must be formed upon the fact of there being a menstrual effort or not; and, if there be, upon the existence or non-existence of obstructions. If the menstrual molimen occur, and there be neither obstruction nor discharge, we may conclude the case to be one of simple amenorrhœa.

117. The *treatment* must depend upon the constitution of the patient, and will vary, as it is administered during an interval, or at a menstrual period. In patients of a full habit, venesection will often afford relief. This must be followed during an interval by a diminution in the quantity of the food, absence of stimulants, exercise, and occasional purgatives. When the patient is of a weak, nervous, or leuco-phlegmatic constitution, the system should be strengthened by generous diet and the moderate use of wine, with gentle exercise. Preparations of iron will be found very useful. By the older writers a long list of emmenagogues is given; but modern experience has reduced the number. Iodine, strychnine, electricity, and iron, certainly seem to have a direct power over the uterus, and may be used advantageously. Stimulating injections into the vagina or uterus have been recommended, but they are very questionable. M. Carron du Villard has succeeded with the cyanuret of gold, Dr. Loudon by leeches to the breasts, Sir J. Murray by cupping-glasses to these organs, Rostan by leeches to the os tincæ, Soult with aconite, Hannay with the ammoniated tincture of guaiacum, and Schönlein by enemata of aloes. Stimulating the neighboring organs (the rectum and bladder) is often beneficial.

[The author has shown less than his wonted clearness on this subject. He has fallen into the common error of regarding amenorrhœa as a disease; whereas it is only an occasional symptom — merely the non-performance of a function, the exercise of which is not always necessary for the health of the female, during the period of her life when it usually occurs. It has been shown (page 90) that women may even bear children without menstruating. I know a maiden lady, now nearly fifty years old, who has generally enjoyed very good health, although she never menstruated more than twice a year, and sometimes only once in twelve or fifteen months. Amenorrhœa, therefore, is not properly a disease, but a consequence of either individual organization, disorder of the uterus or ovaries, or of some other organ or organs, of sufficient importance for the disturbance of their functions to affect materially the patient's constitution. When it is the consequence of peculiar organization, of course all attempts to excite or produce the discharge will be vain, and most likely pernicious; when it depends upon disorder of any one or more organs, it is obvious that the pathological condition of these must be sought out and removed before we can hope that the menstrual flow can be restored. In such cases, all the means adapted to restore health to the system, medicinal or hygienic, may be regarded as emmenagogue; but that we possess any article having the direct power of causing or restoring the regular monthly discharge of blood from the uterus, apart from its property of overcoming some morbid condition of the uterus or ovaries, or of some other organ by which the general health of the individual is impaired, has not yet been proved, nor is it probable that any such exists. Nothing can be more opposite and heterogeneous than the articles commonly prescribed as emmenagogues; and it is therefore with justice that they are classed by Dr. Ferguson as "nostrums." The little confidence reposed in such agents has induced some practitioners to attempt the restoration or establishment of the discharge by means of a more direct nature. In some instances of mere torpor, electricity has been useful in exciting the capillaries to greater activity by its direct impression on the nerves of the uterus; but it is a means which is adapted to a very limited class of cases. "Stimulating injections into the vagina and uterus," are indeed questionable—into the latter organ, imminently dangerous. This is the declaration of Bretonneau, Ricord, and several other respectable authorities. "M. Hourmann relates a case where violent abdominal pain, followed by metro-peritonitis, was caused by the injection of a decoction of walnut leaves into the uterus, for the cure of an obstinate leucorrhœal discharge, which had been traced to the cavity of that organ. Wishing to ascertain whether these dangerous symptoms could be produced from a portion of the fluid having passed through the fallopian tubes into the cavity of the abdomen, he found, on injecting fluid into the uterus after death, that *such was actually the case.*" If the opinion now generally admitted by physiologists shall be fully established, that menstruation is intimately connected with, or dependent on, the maturation and shedding of Graafian vesicles, it is manifest that little good can be expected from articles that are not calculated to impress favorably the ovaries.]

118. *Amenorrhœa, with vicarious Uterine Leucorrhœa,* differs essentially from the preceding varieties, inasmuch as uterine secretion exists, whereas in them the uterus was quiescent. The product is a white or colorless fluid, and so far, not the menses; but the symptoms of menstruation occur, and the patient does not require medicine acting directly upon the uterus. I have already alluded (§ 105) to the leucorrhœa which occurs at the commencement of menstruation, and which is generally superseded by the menses after one or two periods. It is only when this change does not take place that we need interfere. The white discharge may continue periodically to usurp the place of the catamenia; but, in addition, it often continues during the interval.

119. *Treatment.*—When the white discharge is persistent, the case is one of uterine leucorrhœa, and requires the appropriate treatment; but when it occurs only at intervals, as vicarious of the menses, our object should be to strengthen the constitution by generous diet, exercise, bathing, etc., and tonic medicines. I have found great benefit in such cases from the carbonate of iron.

120. *Suppressio Mensium.*—A suppression of the menstrual discharge

may occur suddenly, or more gradually; in other words, it may be acute or chronic.

121. Among the causes of *Acute Suppression of the Menses* may be mentioned cold caught during their flow, by wet feet, etc.; sudden mental emotion, or a bodily shock, fear, disease, etc.

The amount of disturbance consequent upon the sudden arrest, varies a good deal. Most frequently a degree of fever results, with headache, hot skin, thirst, quick pulse, etc.; or the patient may be attacked by local inflammation of the brain, lungs, intestinal canal, or of the uterus itself. Sometimes, instead of inflammation, we see attacks of hysteria simulating inflammation, or of neuralgia of different parts. Occasionally derangements of the senses, aphonia, imperfect vision, etc., or paralysis and apoplexy, follow.

The sudden suppression, from a definite cause, will distinguish this form of amenorrhœa from all others.

122. *Treatment.*—The first object is to recall the discharge, if possible. For this purpose the patient should take hip-baths or pediluvia, and swallow some warm drinks. Mild diaphoretics and gentle purgatives will also be useful. Should all our attempts fail, we may content ourselves with mitigating the severer symptoms, until the approach of the next menstrual period, when the diligent use of the ordinary remedies will probably be followed by the proper secretion or by a colorless discharge. If neither take place, then we must have recourse to some of those remedies, already mentioned, which act directly upon the uterus.

123. *Chronic Suppression of the Menses* may be the issue of an acute attack, or it may arise from the gradual supervention of delicate health, or from disease of the ovaries, uterus, etc.; or it may occur as the termination of menstruation. The quantity of the discharge may diminish, and the periods become irregular, until at length the function ceases. But very often the menses are superseded by leucorrhœa, at first periodic, but ultimately persistent.

The *symptoms* which develope themselves are headache, loss of appetite, pain in the side and back, debility, and general deterioration of health.

The most important point for *diagnosis* is to distinguish this form of suppression from pregnancy, and which will mainly depend upon the absence of the usual signs of pregnancy, at a period when they ought to be present.

124. *Treatment.*—When the suppression has been the result of disease, upon its removal the catamenia will return; and, if it have been caused by leucorrhœa, the proper treatment of that disease will generally end in the restoration of the menstrual discharge. When the suppression is uncomplicated, the remedies for simple amenorrhœa may be tried; but caution will be necessary, and a careful estimate of the general condition of the patient, together with a vaginal examination, in order to make sure that there is neither organic disease, nor obstruction of the womb, and that the case be not one of premature but normal cessation of the menses.

125. *Vicarious Menstruation.*—This is a very curious deviation from normal menstruation, and seems a provision for, in some degree, mitigating the constitutional effects of suppressed menstruation, by substituting a similar discharge from some other part. It is recorded to have taken place from the nostrils, eyes, ears, gums, lungs, stomach, anus, bladder, nipples, the ends of the fingers and toes, from different joints, from the axilla, from the stump of an amputated limb, from ulcers, from varicose tumors, and from the surface of the skin generally. The more extensive mucous membranes are, however, most frequently the seat of the discharge. It appears to be sometimes blood; in others it has the characters of catamenial fluid, being dark-colored, thin, and not coagulable. The repetition of this discharge may

occur at the regular period, or it may intermit; and it does not appear that any serious result follows, even when delicate organs are the seat of it. Sooner or later the uterus resumes its functions, and the attack ceases.

[The cases of the so-called "vicarious menstruation," are nothing more nor less than cases of simple capillary hemorrhage, resulting from the general disturbance of the circulation which occurs during amenorrhœa. The hemorrhage may take place at nearly the natural periods of menstruation, but generally it appears at irregular periods. Although in every case it is dependent on an arrest of the menstrual discharge from the uterus, yet it cannot properly be said to take or supply the place of the latter.]

126. *Treatment.*—After this discharge has once occurred, it will be proper to take measures to relieve the system in a less questionable manner, by venesection, cupping, or leeches; and a careful watch will be necessary. If the evacuation take place from the lungs or stomach, opium combined with lead or bismuth, and the mineral acids, will be found beneficial. During an interval, the patient may be treated much in the same way as for amenorrhœa, and occasionally we may try some of the direct remedies.

127. II. DYSMENORRHŒA, *difficult or painful menstruation.*—This form of abnormal menstruation consists of severe pain in the secretion or emission of the discharge, which may be scanty, profuse, or about the usual amount. The attack is occasionally confined to one or two periods, but more frequently lasts for a longer time, and sometimes for many years. From the different character of the pain and constitutional symptoms, I have divided the disorder into three species,—neuralgic, inflammatory, and mechanical dysmenorrhœa.

128. *Neuralgic Dysmenorrhœa.*—This variety may occur at any age, but is more frequent after the thirtieth year than before; in unmarried than in married women, and, if married, in those who have not borne children. It is almost confined to those of a nervous temperament, and of a thin delicate habit. The monthly paroxysms present all the characteristics of neuralgia; and I am very much inclined to agree with Dr. Tyler Smith, that the chief seat is in the ovaries. For a short time previously, there is a sense of general uneasiness, a deep-seated feeling of cold, and headache, sometimes alternating with pain in the back. The latter commences in the region of the sacrum, and extends round to the lower part of the abdomen, and down the thighs. The amount of suffering varies; but it is sometimes very great. After a longer or shorter period, the catamenia appear, sometimes slowly and scantily, in others, in slight gushes. The quantity differs in different persons, and in the same person at different times. The quality of the discharge may be unchanged, but we frequently find it paler, and occasionally mixed with small clots.

In some cases, there is a membrane, composed of plastic lymph, discharged either in shreds, or in the form of the uterine cavity which it has lined. It seldom occurs regularly, contrary to the opinion of Dr. Denman. It was first, I believe, described by Morgagni; and since by Denman, Burns, and other obstetric writers. Dr. Simpson has recently expressed an opinion that these productions "are not the results, as is generally supposed, of fibrinous or plastic *exudations upon* the free surface of the uterus, but that they consist of *exfoliations* of that membrane itself." At present I confess I am not prepared to agree with the able and learned Professor. Denman states that he never knew a woman conceive by whom this membrane was secreted; but this conclusion appears to be too general. Conception is rare under such circumstances; but I have known it occasionally take place.

The symptoms enumerated are not always mitigated on the appearance of the menses; the pulse is scarcely quickened, nor is there any feverishness. The duration of a period is variable. In some cases there is comparatively little constitutional injury sustained, but in others the patient's health is much deteriorated.

The cervix uteri undergoes the change usually observed during menstruation but nothing else is detected by an internal examination.

From an attentive examination of these cases, I have been led to the conclusion that the disease is generally of a simple neuralgic character. Probably in those cases where the membrane is discharged there may be, as Dr. Locock thinks, a degree of inflammation of the mucous membrane, of a peculiar kind.

The *causes* are cold, sudden shocks, mental emotions, etc., acting upon an irritable condition of the womb.

129. *Treatment.* — The indications are twofold; first, to reduce the pain during an attack; and, secondly, to prevent its return, by appropriate remedies during an interval. The first indication is best answered by sedatives; opium or some of its preparations; hyoscyamus, conium, etc., which may be given alone or in combination with camphor. Should the stomach be irritable, they may be exhibited in an enema. I have remarked that the discharge increases when the pain is relieved. Other remedies have been tried with success; as, the acetate of ammonia by Massuyer, Cloquet, and Patin; ergot of rye by Dewees and Gooch, etc. etc.

[In a few instances, I have derived advantage from the administration of ten grains of ergot, morning, noon, and night, commencing three or four days before the expected attack, and continuing it daily until the period arrived. As soon as the attack commences, I have always found it advisable to moderate its violence by sending the patient to bed, applying warmth to the feet and to the vulva, and administering some of the preparations of opium. Three grains of opium as a suppository, or sixty drops of laudanum, suspended in a tablespoonful of mucilage, as an enema, is a prescription that has always afforded great relief at the time, and, apparently, lessened the disposition to a return at the next period. In severe cases, it may be proper to repeat the anodyne every day until the pain ceases.]

During the intervals, every effort should be made to strengthen the patient, and to diminish general and local irritability. The diet should be nourishing, and plenty of exercise in the open air should be taken by the patient. Chalybeate waters or some preparation of iron may be given. Dr. Locock speaks highly of a mixture of equal parts of *vinum ferri* and the *spirit. æther. sulph. co.*, of which from half a drachm to a drachm may be taken two or three times a day. Dr. Dewees has tried the *tinct. cantharid.*, and Dr. Chapman the senega root, with success. A blister to the sacrum, or a caustic issue, is often of great use; and I have seen much benefit derived from the daily use of vaginal injections of tepid or cold water, during the interval. On the approach of the next period, warm water should be substituted, and the patient should use a hip-bath or pediluvium for two or three nights in succession, antecedent to the eruption of the menses. I have succeeded in curing a case in which the false membrane in sheds was discharged every month, by repeated applications of the strong tincture of iodine to the cervix uteri. This is by far the most obstinate variety of the disorder.

[Dr. Dewees found advantage from the administration of the volatile tincture of guiacum during the intervals of menstruation. When the patient was of a robust habit, with a firm and bounding pulse, he directed the use of the remedy to be preceded by bleeding, smart purging, and a low diet. To obtain benefit from the guiacum, perseverance in its use for several months is often necessary. The dose directed by Dr. Dewees was a teaspoonful three times a day, in a glass of sweetened milk, or, when not counterindicated, in a glass of some light wine. The tincture used by the Doctor was made of four ounces gum guiacum, one drachm and a half of carbonate of soda, and an ounce of allspice; these were digested in a pint of proof-spirits for a few days, when the volatile spirits of ammonia was added in the proportion of one or two drachms to every four ounces of the tincture.]

130. *Inflammatory Dysmenorrhœa.* — The subjects of this form differ as widely from those of the former as its symptoms. It occurs in females of a full habit and of a sanguine temperament, in the married as well as in the unmarried, and in those who have borne children. Few precursory symptoms announce the attack; a degree of restlessness and feverishness, rigors, flushing, and headache, generally precede the severer symptoms. For some time before and after the catamenia appear, the suffering is very great; the patient complains of pain across the back, aching of the limbs, weariness, and intolerance of light and sound; the face is flushed, the skin hot, and the pulse full, quick, and bounding. Delirium occasionally supervenes. Most frequently the symptoms are mitigated when menstruation takes place, and by degrees subside. The discharge is generally sufficient, and in some cases is accompanied by the secretion of the plastic membrane spoken of above.

During the intervals, the health of the patient is little affected; she may be subject to headaches, and pain in the side, but these are generally transient, and do not interrupt the functions of the different organs. Uterine leucorrhœa is not unfrequently present during the interval. An internal examination during the attack affords evidence of some congestion of the uterus; the cervix is swollen, and the heat of the parts increased. Dr. Dewees has noticed pain and swelling of the breasts as an occasional accompaniment of this form of dysmenorrhœa.

[In a recent very interesting treatise on the Diseases of Menstruation, etc., Dr. E. J. Tilt has endeavored to show: That *dysmenorrhœa* is often produced by subacute ovaritis; and sometimes of the uterine engorgement which it determines. That it is often the result, also, of morbid ovulation, and frequently a symptom of ovarian peritonitis. That subacute ovaritis, by determining the inflammatory swelling of the neck of the womb, is a common mediate cause of dysmenorrhœa; the painful symptoms being, in many instances, produced by the partial closure of the neck of the womb, and the consequent effusion of menstrual secretion into the peritoneum.]

A severe attack of either variety has the effect of precluding conception; but I have repeatedly known conception to take place in spite of, and with benefit to slighter cases.

[Dr. Ryan relates two cases in which the dysmenorrhœa was aggravated by marriage; we have seen many such. According to Dr. Dewees, conception very rarely, if ever, occurs, when there has been discharged during menstruation a membranaform substance. Dr. Ashwell (Diseases of Females) states, "that when pregnancy occurs during the continuance of dysmenorrhœa, the female is exposed to the risk of abortion.]

131. *Treatment.* — The success of remedies in this variety of dysmenorrhœa affords a confirmation of its character. Venesection, cupping the loins, leeches, or scarifications to the cervix uteri, afford the quickest relief. They should be followed by saline purgatives, with febrifuge medicines, and cooling drinks. When by these means the inflammatory symptoms are subdued, a dose of calomel and opium at bed-time is often very useful.

During the interval great benefit may be derived from judicious management. The patient should take active exercise, and be as much as possible (if the weather be fine) in the open air. Walking is preferable to riding or driving. Brisk purgatives, and the aloetic are the best, should be regularly administered; and on the approach of the next monthly period, if much excitement arise, it may be well to abstract blood by cupping before the regular attack comes on.

132. *Mechanical Dysmenorrhœa.*—I have applied this title to a difficulty in the emission of the menses, caused by a narrowing or stricture in some part of the canal of the cervix. What may be the cause of this diminution of calibre, whether it be congenital or the result of inflammation, is not easy to determine; but there can be no doubt of its existence. Capuron enumerates it among the causes of dysmenorrhœa; and the late Dr. Macintosh, of Edinburgh, states that he repeatedly detected it. Professor Simpson considers it a very frequent cause. I found it remarkably evident in a case I attended with Dr. Charles O'Reilly, of this city. It may occur at any part of the canal, and the degree of obstruction may vary up to complete closure. I apprehend that there can be little doubt that dysmenorrhœa may result from this cause, though I am far from thinking it so common as was supposed by Dr. Macintosh; neither do I believe that, even where it exists, it is always the cause of the difficulty and pain. In several cases, although I have cured the stricture, the dysmenorrhœa has continued. Nor, even in Dr. Macintosh's case, is there sufficient evidence to prove his point; for he does not show that there was any retention of the menses, but merely, that at subsequent periods menstruation was easier and more abundant: this might have arisen from the direct stimulus to the uterus afforded by the introduction of bougies.

133. *Treatment.*—The fact that such a stricture of the canal of the cervix has been observed, should lead us to make an examination with a small-sized bougie, in all cases of very obstinate dysmenorrhœa. Such an examination is neither difficult, painful, nor injurious, if proper caution be observed. Should stricture be detected, the remedy is the repeated introduction of bougies about every second or third day, and increasing in size, until the obstacle be overcome. No force must be used; and, if any irritation manifest itself, it must be allowed to subside before the operation be repeated.

Dr. Simpson has invented an instrument for the division of the cervix in these cases; but I rather think the object can be more safely attained by dilatation, and quite as satisfactorily.

134. III. MENORRHAGIA.—I shall follow Dr. Locock's example, and apply this term to an increase in the monthly evacuations, whether accompanied by blood or not. Excessive menstruation may occur in various ways: the menses may return too frequently, or too copiously, or at unusual intervals, as during gestation and suckling. Some allowance also must be made for differences of constitution, and perhaps of climate.

I have observed three distinct forms of the disease. In the first, the discharge is of the natural quality, but the quantity or frequency of recurrence is greatly increased. In the second, the discharge is large, and occasionally mixed with blood; but no change in the condition of the body or neck of the womb can be detected by an internal examination. In the third, there is a considerable loss of blood, with a marked change in the size and position of the uterus. Let us examine each of these varieties in detail.

135. *The first variety of Menorrhagia* occasionally commences with a sudden and violent gush from the vagina, after which it stops for some hours, and then recurs; and this alternation may continue during the usual period of menstruation. Sometimes, on the other hand, the discharge goes on regularly, but lasts for ten days or a fortnight, or even three weeks; or, the quantity each time not being excessive, it may return every two or three weeks; and, although this latter case is most frequently met with in women who have borne many children, I have seen it occasionally in unmarried females. It is also, more than the others, connected with that state of the lining membrane which gives rise to uterine leucorrhœa.

The symptoms are exactly those we might anticipate from the long continuance of a debilitating discharge. Exhaustion, languor, indisposition to exertion, weakness across the loins and hips, pallor of countenance, headache, throbbing of the temples, tinnitus aurium, and giddiness, occur more or less in these cases. If relief be not obtained, and especially if uterine leucorrhœa be present, all these symptoms will be aggravated. The exhaustion and languor increase, the face becomes sallow, an aching pain is felt across the loins and round the lower part of the abdomen, pain in the left side, repeated and severe headaches, derangements of the stomach and bowels follow, and, in short, all the secondary symptoms and disturbance of the general health which result from anæmia, no matter how produced. In some extreme, but rare cases, we have diarrhœa and anasarca, with nervous symptoms, melancholy, and even epilepsy, resulting from the disease. Nothing is discovered by a vaginal examination: there is neither swelling nor increase of heat about the uterus; the os uteri is slightly open, as usual during menstruation, but there is no tenderness.

Among the causes we may enumerate repeated child-bearing, over-suckling. excessive coition, cold, mental emotion, etc.

136. *Treatment.*—The first indication is to remove the cause: if it proceed from over-suckling, the child should be weaned, and the patient should live "*absque marito.*"

In persons of a full habit of body, when the attack is recent, it may be necessary to take blood from the arm, cup the loins, or apply leeches to the anus. The discharge may be moderated by a combination of the acetate of lead with opium. When this has failed, I have generally succeeded with ergot of rye, in five-grain doses, three times a day. Dr. Locock recommends cold to the vulva, hips, and abdomen, with vaginal injections of cold water; and Dr. Dewees has used a vaginal injection of sugar of lead and laudanum, with rest on a hard bed, twenty drops of elixir of vitriol, and gentle purgatives, with success. I should altogether deprecate injections into the womb, recently advised by French writers, as a very hazardous practice, and which even their own experience does not justify. A far safer, and as I have found it, a very effectual practice, is to employ enemata of cold water. Plugging the vagina has also been recommended, and as a "*dernier ressort*" may be tried, though it is not a very scientific remedy. Dr. Macintosh speaks highly of an enema containing a scruple of the acetate of lead. The tincture of Indian hemp has a powerful effect upon this form of the disease. It was first tried by my friend, Dr. Maguire of Chapelizod, and on his recommendation, by Dr. Hunt and myself, with extraordinary success, both in the number relieved and the rapidity of cure. From five to ten drops three times a day in some suitable menstruum will be found sufficient.

During the intervals, a blister may be applied to the sacrum, and either kept open or repeated. Vaginal injections, at first of tepid and afterwards of cold water, daily, will be found very useful. Benefit will also be derived from sponging the loins and lower part of the abdomen with cold salt-water. Tonics may be given, comfortable warmth preserved, and a generous, but not too stimulating, diet allowed.

137. *The second variety of Menorrhagia* differs from the first, in the discharge of blood which accompanies the secretion. It seldom occurs in unmarried or young females, and generally in those of a leuco-phlegmatic constitution, who have been debilitated by disease or frequent child-bearing. The progress of the disorder is gradual; one or two small clots appearing at first, then an intermission, and a more copious recurrence. After some time, the discharge of blood may be considerable, so as in some cases to produce fainting. It is of course impossible to ascertain whether the catamenia themselves are altered in quantity or quality. A vaginal examination throws no light upon the nature of the disease, the uterus being in its usual state during menstruation. The constitutional effects are similar to

those noticed under the first form (§ 135), but more severe, and produced more rapidly.

138. *Treatment.*—The remedies recommended for the former variety are equally available here. Opium, alone or in combination with lead, and ergot, or Indian hemp, during the attack; with counter-irritation to the sacrum, the *douche* to the loins, or cold sponging, vaginal injections or enemata, during the interval, are our chief resources.

[The juice of the common lesser nettle (*Urtica urens*) is strongly recommended by M. Ginestet, in doses of fifteen to thirty drachms. In preparing the juice, a quantity of the green herb is bruised, with the addition of a little water, and the fluid portion then strained off by pressing the mass in a linen bag. One dose is said to be generally sufficient to check the discharge.[1]]

139. *The third variety of Menorrhagia* differs considerably from the other two; the discharge is more profuse, and its effects more severe; it is accompanied by marked alterations in the condition and relations of the uterus, occurs at a later period of life, and is more difficult to cure. The attack is not confined to any one kind of constitution or temperament; it occurs in the plethoric and in the debilitated, in the melancholic as well as in the sanguine. I have never seen it in a patient under forty years of age, nor after the cessation of the catamenia.

The attack is preceded for some time by irregularity of the menses, both as to time, quantity, and the duration of each period, with occasional uterine leucorrhœa during the intervals. It is not until the menses have flowed naturally for about twenty-four hours, that the sanguineous discharge appears. Large clots are then expelled, in addition to a great increase in the fluid discharge. At first, the attack lasts seven or ten days only, but in cases of longer standing I have occasionally known it to continue throughout the interval, and terminate after the next period either gradually or suddenly. The quantity lost varies, of course: it is sometimes very large; it was sufficient in one case to excite fears of a fatal result.

The recumbent posture appears to have no effect upon the discharge, there being as much observed during the night as the day. Any exertion or long standing never fails to increase the amount.

During the attack, the patient complains of excessive exhaustion, of a sense of weight in the pelvis, of a dull pain there occasionally, and of weakness in the loins. In all the cases I have seen there was considerable dysuria, especially after long standing: several, indeed, were obliged to lie down before they were able to evacuate the contents of the bladder completely.

The general health, of course, suffers considerably; the appetite diminishes, the tongue is clean, though pale, the bowels become constipated, the surface blanched, and the strength much reduced.

The pulse is occasionally quickened, but more generally quiet, and enfeebled in proportion to the loss of blood.

An *internal* examination will detect the os uteri somewhat lower in the pelvis, and directed more towards the sacrum than usual. It is rather more patulous than ordinary, and the cervix is more or less swollen, especially anteriorly where it expands into the body. It appears to be tilted forward by its increased weight, so as to press upon the bladder, thus affording a satisfactory explanation of the dysuria which I have noticed in every well-marked case. No increase of heat is observed in the vaginal canal, or about the cervix. The cervix and lower part of the body of the uterus are generally, but not always, slightly tender on pressure. Of course, the amount of these alterations will vary in different cases.

[[1] Ranking's Half-Yearly Abst. from Encyclop. Méd. de M. Lartigue, Oct. 1844.]

The disease must be regarded as congestion of the uterus occurring at the menstrual period, and giving rise, by its excess, to a rupture of some small vessels. Whether it has anything to say to the production of the organic diseases of the time of life at which it occurs, may not be easy to decide: I think it not improbable.

The *diagnosis* will not be difficult, if we bear in mind the mode of invasion, the character of the discharge, the local characteristics, and the subsidence of the attack.

140. *Treatment.* — Although the complaint appear simple, it is neither easy nor possible in all cases to restrain the hemorrhage by means applied during the attack. I have found opium alone, and in combination with large doses of the acetate of lead, ineffectual. Cold to the vulva and enemata of cold water were equally powerless. Plugging the vagina arrested the discharge for a time, but the irritation it excited seemed to aggravate the other symptoms. Leeches to the vulva had no effect upon it, and the preparations of iron did little or no good. The only remedy, in short, which seems to have the power of controlling the discharge during the menstrual period, is the ergot of rye or Indian hemp. The former may be given in doses of five or ten grains twice or thrice a day. I have never seen it produce any ill effects in this disease, although I have certainly known it fail altogether.

During an attack the patient should be kept in a state of perfect rest: she should lie on a hard mattress, covered rather lightly with bed-clothes, but with warmth applied to the feet. All her drinks should be cool and devoid of stimulants, unless she become faint, and then a little wine may be allowed.

At this period, ergot of rye, or any astringent medicine, may be given. If the discharge be not arrested, and show a disposition to continue throughout the interval, it may perhaps be justifiable to inject the vagina with cold water or an astringent lotion. I have never tried this, but have found enemata of cold water answer the purpose very well.

So long as the discharge continues, the employment of the remedies for the *cure* of the disease must be suspended; but, when once it has entirely ceased, not a moment should be lost. A blister should be applied to the sacrum, and either kept open or repeated. I have always found good result from this; the pain in the back generally becoming less severe, and the whites diminishing in quantity. But by far the most powerful means we possess are vaginal injections of cold water, of a solution of acetate of lead, or other astringents, two or three times a day. The patient should lie on her back in bed, and the fluid should be thrown up gradually. An almost immediate improvement is the result, followed by the subsidence of all the prominent symptoms, even in those cases which relapse subsequently. The swelling of the uterus will be found upon examination to have disappeared, there is probably scarcely any whites, no pain in the back or weight in the pelvis, and the patient is able to walk about without inconvenience.

When the improvement is so marked as this, there is but little fear (with due caution) that the patient will relapse at the next monthly period; but where the relief, though decided, is not complete — where the disease still lingers, then in all probability the next menstruation will be accompanied with the old symptoms, to be met again, and perhaps more successfully, by the same remedies.

CHAPTER III.

GENERATION.—CONCEPTION.

141. IMMEDIATELY after the effective intercourse of the male with the female, a series of changes commences, which ultimately issue in the formation of a new being, possessed of individual or independent life. The first step in this process is called Generation, Fecundation, Conception, etc. The period of fecundity in the human female lasts about thirty years, *i. e.*, from the fifteenth to the forty-fifth year, or thereabouts; in other words, it is contemporaneous with menstruation.

142. From the hidden nature of the process and the stupendous results, the subject has always possessed the deepest interest for physiologists, and at the same time given rise to a multitude of theories, most of them, to say the least, mere hypotheses. Dr. Allen Thompson, in his valuable paper,[1] thus classifies them: "The greater number of the older theories of generation may be brought under one or other of these divisions; viz., the theory of the *ovists*, of the *spermatists*, or of that of *combination*, *evolution*, or *epigenesis*. According to the first-mentioned of these hypotheses, or that of the ovists, the female parent is held to afford all the materials necessary for the formation of the offspring, the male doing no more than awakening the formative powers, possessed by and lying dormant in the female product. This was the theory of Pythagoras, adopted in a modified form by Aristotle; and we shall afterwards see that it resembles most closely the prevailing opinion of more modern times. The terms, however, in which some of the older authors expressed this theory are very vague; as, for example, in the notion that the embryo or new product is formed from the menstrual blood of the female, assisted by a sort of moisture descending from the brain during sexual union.

"According to the second theory, or that of the spermatists, among the earlier supporters of which Galen may be reckoned, it was supposed that the male semen alone furnished all the vital parts of the new animal, the female organs merely affording the offspring a fit place and suitable materials for its nourishment. Immediately upon the discovery of the seminal animalcules, these minute moving particles were regarded by some as the rudiments of the new animal. They were said to be miniature representations of men, and were styled *homunculi;* one author going so far as to delineate in the seminal animalcule the body, limbs, features, and all the parts of the grown human body. The microscopic animalcules were held by others to be of different sexes, to copulate, and thus to engender male and female offspring: and the celebrated Lieuwenhoek, who was among the first to observe these animalcules, described minutely the manner in which they gained the interior of the egg, and held that after their entrance they were retained by a valvular apparatus.

"The theory of *syngenesis* or combination seems to have been applied principally to the explanation of the reproduction of quadrupeds and man, the existence and nature of the ova of which were involved in doubt. This hypothesis consists in the supposition, that male and female parents both furnish simultaneously some semen or product; that these products, after sexual union, combine with one another in the uterus, and thus give rise to the egg or structure from which the fœtus is formed. In connection with this theory, we may also mention that of *metamorphosis*, according to which, a formative substance is held to exist, but is allowed to change its form in order to be converted into the new being; as also the notion of Buffon, that organic molecules universally pervade plants and animals, that these are all endowed with productive powers, that a certain number are employed in the construction of the textures of organized bodies, and that in the process of generation, the superabundant quantity of them proceeds to the sexual organs, and there constitutes the rudiments of the offspring."

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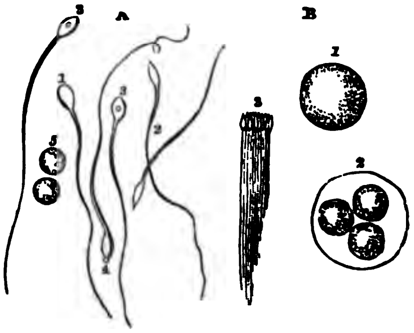
[1] Cyclopædia of Anatomy and Physiology. Art.—Generation.

It would be mere waste of time to enumerate the modifications of these theories, which have been promulgated in profusion from time to time; of which "groundless hypotheses" Drelincourt reckoned two hundred and sixty-two, and in addition to which, as Blumenbach remarks, "nothing is more certain than that Drelincourt's own theory formed the two hundred and sixty-third."

143. The best plan will be to state briefly such facts as we possess, which bear upon the conditions of generation and the changes produced by it. We have already ascertained that the ovaries contain certain vesicles, and we have reason to believe that these undergo certain changes before and after a successful coitus, and that their contents, or that of one, constitutes the contribution of the female towards the production of a new being. Again, we know that the testes of the male secrete a peculiar fluid called semen, which in the act of intercourse is projected into the vagina, and arrives by a process we cannot as yet explain in the uterus of the female, and is supposed to exert a peculiar influence upon the Graafian vesicles; but the difficulty has been to explain how that influence is communicated or carried to the ovary, or whether impregnation takes place in the ovary, fallopian tubes, or uterus. Various theories have been propounded (that of an *aura seminalis*, for example), but none were consistent with the observations made upon other orders of animals; from which it appeared that contact of the semen with the ova was necessary. This obstacle seemed to be removed by the observations of Dr. Bischoff of Heidelberg, Dr. M. Barry, and Professor Wagner of Berlin, who believed themselves to have detected spermatozoa in the fallopian tubes, especially at their ovarian extremity. It appears doubtful whether spermatozoa have really been detected in the ovary or at the upper extremity of the fallopian tubes, but Bischoff still holds the opinion that impregnation takes place generally in the upper part of the fallopian tubes: Prevost, Dumas, and Barry, that spermatozoa enter bodily into the ovum. The latter view is not supported by recent researches, and Pouchet opposes both that and Bischoff's, maintaining that fecundation takes place only in the lower part of the fallopian tubes or uterus. A very strong argument in favor of ovarian or tubal impregnation is the occurrence of extra-uterine—ovarian or fœtal—gestation. In such cases the spermatozoa must have reached both tube and ovary. What I think clear enough is, that the contact of the spermatozoa with the liberated ovum is necessary to fecundation; and this is confirmed both by the observations of comparative anatomy and by the experiments of Cruikshank, Haighton, and Blundell, who found that if the fallopian tubes were rendered impermeable, impregnation was prevented; but this does not prove where impregnation is effected; whether in the tubes or in the uterus, or, as may be probable, sometimes in one and sometimes in the other. The experiments of Spallanzani and others have proved that a very small quantity of semen is sufficient for fecundation.

[The semen as it is discharged from the urethra, is an exceedingly mixed fluid, consisting of spermatozoa derived from the testicles, with the secretions of the epididymus and vas deferens, the prostate or Cowper's glands, and the mucous follicles of the urethra. It is now almost universally admitted that it is the spermatozoa alone which contribute the essential or fecundating portion of the seminal fluid. These bodies are developed within certain cells found in the secretion of the testes before this leaves the gland. Within the cells the spermatozoa are in the form of filaments arranged in bundles, but in the passage of the semen through the efferent vessels, the cells rupture and set free the spermatozoa. Each spermatozoon consists of an oval and flattened body, and a filamentous portion or tail. The width of the body is about the one six-thousandth part of an inch, and the entire length of the spermatozoon is from the fourth to the sixth-hundredth part of an inch. These bodies present no evidences of organization, consisting apparently of a homogeneous, tolerably firm, albumenoid substance. They have an almost constant vibratory or wriggling motion, precisely similar to that of a ciliated epithelium cell, which at one time caused them to be considered as distinct animalcules. They are, strictly speaking, "organic forms which are produced in the testicles, and constitute a part of their tissue; just as the eggs, which are produced in the ovaries, naturally form a part of those organs, . . . and like the egg, also, the spermatozoon is destined to be discharged from the organ where it grew, and to retain, for a certain length of time afterward, its vital properties."[1]

Fig. 43.



Spermatozoa from man, and their development. (Wagner).—A. Spermatozoa from the semen of the vas deferens. 1 to 4. Show their variety of character. 5. Seminal granules.—B. Contents of the semen of the testis. 1. Large round corpuscle or cell. 2. A cell containing three roundish granular bodies, from which the spermatozoa are developed. 3. A fasciculus of spermatozoa, as they are seen grouped together in the testis.

The question as to how the sperm arrives at the ovarium, has not yet been settled. Professor Wagner, who is high authority, considers that the sperm reaches the ovary partly by the ciliary motions, which begin in the cervix uteri, partly by the contractions of the tubes, and partly by the motility of the spermatozoa.[2] Dr. Carpenter, however, seems to think the latter is the sole means! "That the spermatozoa make their way towards the ovarium, and fecundate the ovum either before it entirely quits the ovisac, or very shortly afterwards, appears to be the general rule in regard to mammalia; and the question naturally arises,—by what means do they arrive there? It has been supposed that the action of the cilia, which line the fallopian tubes, might account for their transit; but the direction of this is from the ovaria towards the uterus, and would therefore be opposed to it. A peristaltic action of the fallopian tubes themselves may generally be noticed in animals killed soon after sexual intercourse; and in those which have a two-horned membranous uterus, such as is evidently but a dilatation of the fallopian tube, this partakes of the same movement, as may be well seen in the rabbit; in animals, however, which have a single uterus with thicker walls (as in the human female), it must evidently be unavailable. Among the tribes whose ova are fertilized out of the body, the power of movement inherent in the spermatozoa is obviously the means by which they are brought into contact with the ova; and it does not seem unreasonable to suppose that the same is the case in regard to the higher classes; and that the transit of these curious particles from the vagina to the ovaries, is effected by the same kind of action as that which causes them to traverse the field of the microscope."[1]]

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[1] [Dalton's Human Physiology, p. 460.]

[2] [Dunglison's Human Physiology, vol. ii. p. 872.]

144. Thus, then, we may enumerate as the conditions of generation, the actual contact of the male semen or its spermatozoa with a healthy Graafian vesicle or an ovule. The immediate effect of this contact or of successful intercourse, is the production of great excitement and vascular turgescence of the uterus, ovaries, and fallopian tubes, which lasts for some time, and during which an alteration takes place in the relations of the different parts. The fimbriated extremity of one of the fallopian tubes is turned towards the ovary of that side, and embraces it closely, over the vesicle which has been, or is to be, impregnated. This delicate operation has been attributed partly to the vascular turgescence, and partly, as in certain animals, to muscular action. How soon it takes place after impregnation is not yet determined; it must occur at each menstrual period, if the ovular theory of menstruation be true.

145. With regard to the ovum itself, one or more of the vesicles enlarges and becomes vascular, the vessels converging towards the point, at which the rupture of its coats is to occur. "The fluid," says Dr. Allan Thompson, in the essay already quoted, "contained in the vesicles which are about to burst, previously transparent and nearly colorless, now becomes more viscid and tenacious, somewhat turbid, and of a reddish color; and in some animals, it is possible in such ripe vesicles to perceive with the unassisted eye, in a favorable light, a whitish opaque spot on the most prominent part, indicating the layer of granules, or proligerous disc, in the centre of which the ovum is situated. After a certain time, a small opening is formed at the most prominent part of the coverings of the vesicle; the vesicle bursts, and its contents escape through the opening: they are received into the infundibulum, which is now applied firmly against the ovary; and the ovum entering the fallopian tube is conveyed along it, probably by its slow and gradual vermicular contractions, until it at last arrives at the uterus." Recent observations would lead us to attribute some influence in this transmission, to the ciliary motions of the villi of the mucous membrane lining the tube.

146. It is scarcely possible to obtain an opportunity of examining the minute changes which take place in the Graafian vesicle in the human female; we must therefore avail ourselves of the information afforded by comparative physiology, and the more readily, as the process does not differ essentially. The following description is extracted from Dr. M. Barry's beautiful paper:[2] —"Among the changes occurring in the ovum (of the rabbit) before it leaves the ovary, are the following: viz., the *germinal spot* previously at the inner surface, passes to the centre of the *germinal vesicle;* the *germinal vesicle*, previously at the surface, passes to the centre of the *yelk;* and the membrane, investing the yelk, previously extremely thin, suddenly thickens." The *tunica granulosa* and *retinacula* are discharged with the ovum.

"Among the changes usually taking place in the ovum during its passage through the fallopian tube, are the following: viz., 1. An outer membrane, the *chorion*, becomes visible. 2. The membrane originally investing the yelk, which had suddenly thickened, disappears by liquefaction; so that the yelk is now immediately surrounded by the thick transparent membrane (*zona pellucida*) of the ovarian ovum. 3. In the centre of the yelk there arise several very large and exceedingly transparent vesicles. These disappear, and are succeeded by a smaller and more numerous set. Several sets thus successively come into view, the vesicles of each succeeding set being more numerous and smaller than the last, until a mulberry-like structure has been produced, which occupies the centre of the ovum. Each of these vesicles contains a colorless and pellucid nucleus, and each nucleus presents a nucleolus.

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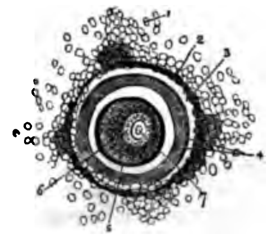
[1] [Human Physiol., p. 595.]

[2] Philosophical Trans., 1839, part ii. p. 350.

Fig. 44.



Graafian Vesicle after Impregnation.—1. Tunica granulosa. 2. Chorion. 3. Zona pellucida. 4. Thick transparent membrane. 5. Yelk ball. 6. Germinal vesicle. 7. Germinal spot.

Graafian Vesicle after Impregnation.

"In the uterus, a layer of vesicles, of the same kind as those of the last and smallest here mentioned, makes its appearance on the whole of the inner surface of the membrane which now invests the yelk. The mulberry-like structure then passes from the centre of the yelk to a certain part of that layer (the vesicle of the latter coalescing with those of the former, where the two sets are in contact, to form a membrane, the future amnion), and the interior of the mulberry-like structure is now seen to be occupied by a large vesicle, containing a fluid and dark granules. In the centre of the fluid of this vesicle is a spherical body, composed of a substance having a finely granulous appearance, and containing a cavity filled with a colorless and pellucid fluid. This hollow and spherical body seems to be the true germ. The vesicle containing it disappears, and in its place is seen an elliptical depression, filled with a pellucid fluid. In the centre of this depression is the germ, still presenting the appearance of a hollow sphere."

It is unnecessary to apologize for this minute account of the changes in the vesicle; the interest of the question, and the light thrown upon it by the able and careful researches of the distinguished physiologist from whom I have quoted, are more than sufficient reason for laying the results before my readers.

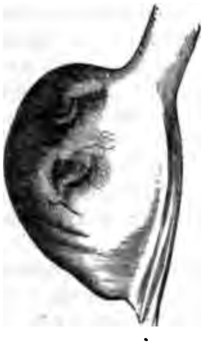
147. Let us now retrace our steps a little; during the increase of the vesicle in the ovary, "the inner coat becomes intensely vascular, and on its external surface, a soft gelatinous substance, of a yellowish-red color, consisting apparently in part of blood and in part of lymph, is poured out between the two coats of the vesicle, in considerable quantity all round, except at the point where it is pressed towards the external surface of the ovary." Such is Dr. Montgomery's description of the formation of the *corpus luteum*, which he conceives aids in the expulsion of the ovum, after having served "as a sort of little temporary uterus" to the contained germ, "lined with a serous membrane, covered externally by another, and having interposed be-

tween them the fleshy or granular structure of the corpus luteum, through which blood-vessels ramify, and exhale through the lining membrane a serous fluid for the support of the early ovum, which as yet lives only by imbibition." Professor von Baer thought that the corpus luteum was the lining membrane of the vesicle in a state of hypertrophy, and Dr. R. Lee believes it to be a deposit external to the lining. Drs. Paterson and Renard agree with Dr. Montgomery; but Knox, Pouchet, Müller, and Dalton, regard it as a hypertrophy of the outer membrane, and formed after the escape of the ovum.

148. Shortly after the evolution of the ovum, the size of the ovary is found to be increased, especially at a certain part which is prominent, and about the size of a nut. At an early period after conception, this small tumor is of a bluish-red or purple color, owing probably to the effusion of blood attendant on the rupture of its coats, and having numerous vessels filled with the florid blood ramifying on its surface. In some part of this colored surface of the tumor, a cicatrix, depression, or aperture may be discovered, being the point at which the ovum escaped from the ovary into the fallopian tube.

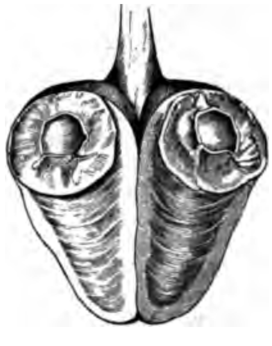
149. These external appearances, however, are inadequate to prove the presence of a true corpus luteum; they require confirmation by the results of an internal examination. "Upon slitting open the ovarium at this part," says Dr. W. Hunter, "the corpus luteum appears a round body, of a very distinct nature from the rest of the ovarium. Sometimes it is oblong or oval, but more generally round. Its centre is white, with some degree of transparency, the rest of its substance has a yellowish cast, is very vascular, tender, and friable, like glandular flesh. Its larger vessels cling round its circumference, and then send their smaller branches inward through its substance;" which substance, according to Dr. Allen Thompson, "has a lobular structure, the lobules radiating in a somewhat irregular manner from the centre to the circumference. The central part of the corpus luteum frequently remains hollow for some time after its production, opening exteriorly by a narrow passage from the part where the rupture of the vesicle originally took place; at other times, this passage is closed more early, and there remains nothing but an indication of its place, in a depression in the centre of the most projecting part of the corpus luteum. The lobules of the corpus luteum, examined with the microscope, exhibit merely a granular structure, and are not formed of acini, as some have described them, so that there is no reason to consider them bodies of a glandular nature."

Fig. 45.



Ovary after escape of Ovum.

Fig. 46.



Corpus Luteum, from Dr. Montgomery.

150. The following measurements of the ovaries and corpus luteum, at the third month of pregnancy, are given by Dr. Montgomery:

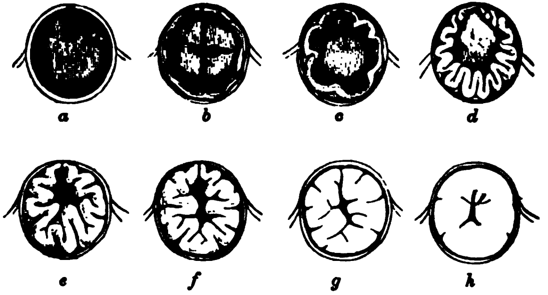
The unimpregnated ovary.		Ovary containing a corpus luteum.	
Length . . .	1 inch 5 lines.	Length . . .	1 inch 3 lines.
Breadth . . .	" 7½ "	Breadth . . .	" 9 "
Thickness . .	" 5½ "	Thickness . .	" 7½ "

Dr. Knox has drawn up the following table of measurements of the corpus luteum at different periods of pregnancy.

No. of days after Impregnation.	Name of Reporter.	Long diameter, in lines.	Short diameter, in lines.	Thickness of the glandular part.	Diameter of the Central Cavity.
5	Horne	9	6	1½	
8	Ditto	9	6	1½	
46	Lee	9	7½	1	6
62	Ditto	6	8½	1	8
62	Clarke	9½	8	8	
70	Montgomery	7	6		
93	Ditto	7½	6½	2½	3
108	Keever	9	7	2	4½ and 2½
108	Knox	7	6		
155	W. Hunter	8½	7		4½ and 1½
186	Rœderer	6	5	8	2
186	Montgomery	6	5	8	2
186	Horne	7½	4½	1	4
201	Lee	6	4½	1	8
280	Rœderer	7	4		
280	Montgomery	6	5		
280	W. Hunter	6	5		
285	Knox	4	2½	1½	1½

151. For a short time after the escape of the ovum, the corpus luteum is said to increase in size, then to remain stationary, and afterwards to diminish slowly. After the third or fourth month the central cavity contracts, and its sides coming in contact, gives it the appearance of an irregular white line, somewhat radiated. After delivery, the corpus luteum shrinks, absorption takes place, and it disappears, though at what time is not quite certain. Dr. Montgomery has observed it five months after delivery; but Dr. Paterson's investigations would lead to the conclusion, that it seldom remains so long.

[Fig. 47.]



Successive stages of the formation of the *Corpus Luteum*, in the Graafian follicle of the Sow, as seen in vertical section;—at *a* is shown the state of the follicle immediately after the expulsion of the ovum, its cavity being filled with blood, and no ostensible increase of its epithelial lining having yet taken place; at *b*, a thickening of this lining has become apparent; at *c*, it begins to present folds which are deepened at *d*, and the clot of blood is absorbed *pari passu*, and at the same time decolorized; a continuance of the same process as shown at *e*, *f*, *g*, *h*, forms the Corpus Luteum, with its stellate cicatrix.

Dr. Dalton gives it as the result of his observation, that the corpora lutea of menstruation and pregnancy follow the same course of development in the first period. "Together with the rupture of the vesicle, the same effusion of blood takes place in either case, followed by a gradual absorption of the coloring matter of the clot, and hypertrophy and folding up of the membrane of the vesicle. When, however, the ovum becomes impregnated, and continues its growth in the uterus, the corpus luteum, instead of reaching its maximum of development at the end of three weeks, and afterwards undergoing a rapid process of atrophy, *continues to develop itself* for a considerable period, and does not, in fact, become very decidedly retrograde until after the termination of pregnancy." "The difference in the progress of the corpus luteum, however, relates not only to its size, but also to its general characters and aspect. The external wall becomes much thicker in proportion to the central coagulum, and at the same time acquires a firmer and more highly organized structure. Moreover, the color both of the convoluted wall and of the central coagulum constitutes an important means of distinction. It has been shown that the corpus luteum of menstruation retains the bright color of its walls till the whole body has become much reduced in size, and that the coagulum in its interior also remains more or less stained with red till a late period. On the other hand, if pregnancy occur, the circumstances are reversed. The color, both of the wall and the coagulum, fades rapidly after the first two months, while the substance of the yellow body continues to increase; consequently, during the greater part of gestation, the corpus luteum of pregnancy will be distinguished from that of menstruation by the dull hue of its convoluted wall, and by the absence of color in the central coagulum."[1]

The number of corpora lutea corresponds exactly to the number of children; as Dr. W. Hunter remarked, "Where there is only one child, there is only one corpus luteum, and two in the case of twins." Meckel examined two hundred females of the class mammalia, and found this correspondence exact.

[Dr. Carpenter denies that there is a correspondence between the number of corpora lutea found in the ovaries of a woman, or of cicatrices on their surface, and the number of children she may have borne. The number of corpora lutea must always be less, he remarks, when there have been many conceptions; but the number of cicatrices may be greater; for several causes, such as the escape of unimpregnated ova, or the bursting of little abscesses, may give rise to such appearances.[2]]

152. Two very important questions here demand notice: 1. Are corpora lutea the result of pregnancy only, and does their presence indicate previous impregnation? And, 2. If not the result solely of pregnancy, can the corpora lutea of pregnancy be distinguished accurately from those of menstruation?

Various opposite opinions have been held upon the first of these points.

Haller, Meckel, Haighton, Velpeau, Montgomery, Müller, etc., believe that corpora lutea are the result of impregnation only; others, as Cruikshank, Gross, Seymour, Gooch, Blundell, Renaud, etc., believe that whilst, as a general rule, corpora lutea result from conception, yet that they are occasionally met with in virgins, the one being true, the other false corpora lutea.

["The true corpus luteum," says Carpenter, "is distinguished by its capability of being injected from the vessels of the ovary; which is not the case with tubercular deposits, or other substances which may simulate it."[3]]

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[1] **Prize Essay, p. 71. [See also Human Physiology, by J. C. Dalton, jr., M.D., p. 478, et seq.]**

[2] **[Principles of Human Physiology, 2d Am. Ed., p. 597.]**

[3] **[Human Physiology, Am. Ed., p. 596.]**

A third class of writers, who believe that ova are discharged during menstruation, and have observed the peculiar change in the part of the ovary from which they have escaped, regard them as equally true corpora lutea, and deny that there is any essential difference between the corpora lutea of menstruation and pregnancy. This opinion was put forward by Sir E. Home, and is adopted by Dewees, Bischoff, Napier, Pouchet, Raciborski, Chereau, etc. M. Pouchet states as his opinion, that "since the fact of spontaneous ovulation has been demonstrated, it must now be superfluous to point out the futility of the distinction between true and false corpora lutea; they are all produced by the same processes; they have all discharged ova before presenting themselves under the aspect which they assume after that occurrence. And whether the ovule which they have expelled does or does not become fecundated, whether or not it undergoes the transformation into an embryo, all have nevertheless the same form and the same structure."[1]

153. Now, the cases and dissections I have heretofore quoted, even if they be considered inadequate to warrant the deduction of a general rule, do at least prove both that an ovum is frequently, if not always, discharged at a menstrual period, quite independent of sexual congress, and that certain changes take place in the membrane from which it escaped, which are in some degree analogous to the corpus luteum; that these changes constitute what may be called the *corpus luteum of menstruation*. So far I must agree with the two latter classes of authorities; but, on the other hand, we find the corpus luteum of pregnancy to differ from this in many particulars, and so much so, as to justify the opinion of the first class of authorities—that the true corpus luteum (taking that found in the ovaries of women during gestation as the standard) was the result and evidence of conception, and of nothing else.

This is the conclusion to which Dr. Dalton has arrived, by an extensive and minute investigation in the human subject and in animals, and I think the evidence we possess quite sufficient to satisfy any impartial inquirer.

It becomes, then, of great importance to state explicitly the points of difference between the two classes of corpora lutea, and the more so, as certain medico-legal inquiries are considerably influenced by their presence or absence.

Dr. Dalton thus states the result of his investigations:—"1. The corpus luteum of pregnancy arrives more slowly at its maximum of development, and afterwards remains for a long time as a very noticeable tumor, instead of undergoing a process of rapid atrophy. 2. It retains a globular, or only slightly flattened form, and gives to the touch a sense of considerable resistance and solidity. 3. Internally it has an appearance of advanced organization, which is wanting in the corpus luteum of menstruation. 4. Its convoluted wall, particularly, attains a greater development, this portion measuring sometimes so much as three-sixteenths to one-fourth of an inch in thickness; while in the corpus luteum of menstruation it never exceeds one-eighth, and is almost always less than that. This difference in the thickness of the convoluted wall is one of the most important points of distinction. It will be much more striking when viewed *relatively to the size of the coagulum*. 5. The color is not by any means so decided a yellow, but a more dusky and indefinite hue. 6. If the period of pregnancy be at all advanced, it is not found, like the corpus luteum of menstruation, in company with unruptured vesicles in active process of development."[2]

[Dr. Dalton, in his Human Physiology, page 486, thus sums up the general differential characteristics of the corpus lutea of menstruation and of pregnancy: "The corpus luteum of menstruation differs from that of pregnancy in the extent of its development and the duration of its existence. While the former passes through all the important phases of its growth and decline in the period of two months, the latter lasts for from nine to ten months, and presents, during a great portion of the time, a larger size and a more solid organization. It will be observed that, even with the corpus luteum of pregnancy, the bright yellow color, which is so important a characteristic, is only temporary in its duration, not making its appearance till about the end of the fourth week, and disappearing after the sixth month."]

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[1] Théorie Positive de l'Ovulation Spontanée, etc. p. 185.

[2] Prize Essay, p. 73.

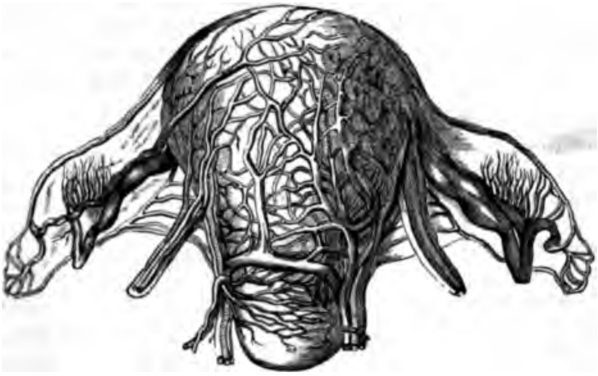
Thus, if due care be taken, the corpus luteum of pregnancy can be distinguished from the changes which follow ordinary ovulation, by whatever name they are called, and therefore the presence of such a corpus luteum is as sure an evidence of pregnancy as it has ever been considered.

CHAPTER IV.

UTERO-GESTATION.[1]

154. **Before** proceeding to investigate the farther development of the ovum, let us examine the *changes which impregnation occasions* IN THE UTERUS, and which prepare it for the reception and nutrition of the fœtus.

Fig. 48.



Vessels of Gravid Uterus.

It has already been stated, that conception is accompanied or immediately followed by congestion of the uterus; its *vessels* are filled with blood, and enlarge gradually, until they become of great size. Many which did not carry red blood before, and therefore were invisible, are now evident, and the whole form an intricate net-work on the surface and in the substance of the organ. Not only are the *arteries* (fig. 48) distended, but to meet this increased labor imposed upon them, their coats are actually increased in thickness, so much so as to preclude their return to their former condition after the object of their temporary enlargement is fulfilled. This explains why we always find them more or less enlarged and tortuous in women who have borne children.

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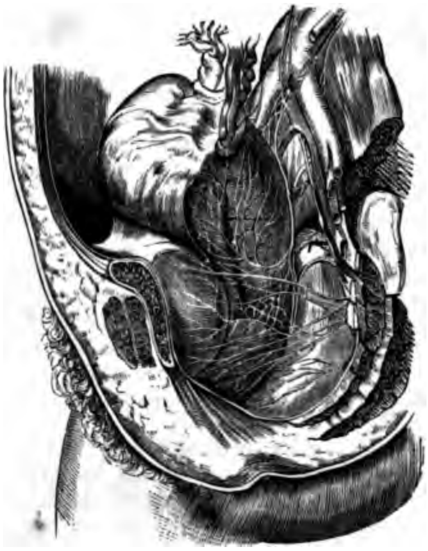
[1] For a minute account of the changes which take place, I would refer the reader to Dr. Farre's admirable article in Todd's Cyclopædia, parts 49 and 50.

The coats of the veins are much thinner, and admit of still greater distension; this is so marked in that part of the uterus to which the placenta is attached, that they have received the name of *uterine sinuses.*

The *lymphatics* undergo a proportionate development, and, in the latter months of pregnancy, may easily be traced. Mr. Cruikshank, I believe, has the credit of first demonstrating them.

Fig. 49.



Nerves of Gravid Uterus.

155. The *nerves* of the uterus (fig. 49), which are very small in its unimpregnated state, increase in size, until at the full term they form large cords, which send off numerous branches to accompany the uterine vessels, and which, anastomosing freely with each other, exhibit an appearance of network, similar to that observed in the vessels. It is now acertained that the real increase is not in the nerve-substance, but in the nerve termina, and so enlarged they do not recover their pristine size after delivery. We are much indebted to the labors of Hunter, Tiedemann, and recently of Dr. Lee, for the additions they have made to our knowledge of the nerves of the uterus.

156. Great as these changes are, they are equalled, if not surpassed, by those which take place in the *proper tissue* of the uterus. In proportion as space is required for the fœtus, on account of its growth, the fibres are loosened, and separate from each other, leaving between them large interspaces, which afford space for, and are occupied by, the enlarging blood-vessels and nerves. The amount of distensibility is very great, and fully equal to the accommodation of the fœtus, during the term of intra-uterine

life. Nor is this distension accompanied by much thinning of the parietes: according to Meckel, they increase in thickness during the first three months, and afterwards diminish to the end of gestation; but even then they are from one to two-thirds of an inch thick, and even more about the insertion of the placenta. To explain this, it has been assumed that new matter is superadded during gestation, and removed after delivery; and this opinion is confirmed by the difference in weight between a virgin uterus and one at the full term, emptied of its contents; the former weighing one ounce, the latter about twenty-four. Even when deprived of its extra quantity of blood by firm contraction after delivery, it is many times larger than before conception.

Mr. Rainey's researches seem to show that this is in the first instance simply from the increase in the volume of the fuciform nucleated fibres; this being, he thinks, "quite sufficient to account for the amount of augmentation of the entire organ, without supposing that organic muscular fibres, not present in the inactive state of the uterus, are absolutely formed during the various stages of its enlargement." "The unimpregnated uterus being, according to this notion, little more than an assemblage of embryonic nucleated fibres, wholly inactive until after the reception of the ovum, when, being roused by an appropriate stimulus, they are called into active operation, and become developed simultaneously and proportionally to the development of the fœtus contained within it; so that, when one has arrived at a state requiring to be expelled, the other has acquired the utmost degree of fitness necessary to effect its expulsion. Now, after the expulsion of the fœtus, since according to the laws of development, it is as impossible that these fibres of the impregnated uterus can return again to their primitive or embryonic condition, as that a full-formed fœtus could relapse into the state of an ovum, they must necessarily become absorbed, and therefore a new set of embryonic fibres would require to be formed for the expulsion of the next ovum: so that each fœtus will have, according to this conclusion, its own peculiar expulsory fibres."[1]

The process of absorption has been shown by Professor Retzius of Stockholm, Dr. Heschl,[2] and others, to be marked by a species of fatty degeneration,[3] which Mr. Barlow and others regard as a step towards organic death.

157. The increase in the *size* of the womb is said to commence at the fundus, immediately after the descent of the ovum, and as this is developed, the body enlarges; last of all, and not before the fifth month, the cervix. But an ingenious American writer, Dr. Read,[4] has proposed the following substitute for this view, and has adduced some weighty arguments in its favor:—"The attachment of the placenta to any portion of the uterus causes a development at that place, which proceeds *pari passu*, till the limits of growth in the placenta having been reached, the enlargement is continued and kept up by the pressure constantly exerted on the uterine walls by the growing contents till the time of parturition."

During the first four months the entire organ is contained in the cavity of the pelvis; soon after which time the fundus may be felt, in thin females, above the symphysis pubis; about the fifth month it reaches midway between the pubes and umbilicus, and gives a roundness and fulness to the lower part of the abdomen; at the end of the sixth month, it is as high as the umbilicus, which it protrudes; during the seventh month, it ascends midway between the umbilicus and the ensiform cartilage; at the end of the eighth month, it reaches the ensiform cartilage and fills the abdomen, having the intestines above and behind it.

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[1] Philosophical Trans., 1850, part ii. p. 519.

[2] Researches on the Conduct of the Human Uterus after Delivery, translated by Dr. R. M'Donnell.

[3] Edin. Monthly Journal, Aug., 1852, p. 127, note.

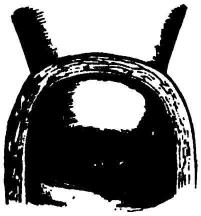
[4] American Journal of Med. Science, April, 1858.

During the ninth month, although it somewhat increases in size, yet, from the yielding of the abdominal parietes, it does not ascend, but on the contrary is somewhat lower than previously. Its capacity is immensely increased: according to the calculations of Levret, its superficies may be estimated at 339 inches, and its cavity will contain 408 inches; its length being from 12 to 14 inches; its breadth from 9 to 10, and its depth, antero-posteriorly, from 8 to 9 inches.

158. A considerable change takes place in the cervix uteri; it becomes somewhat swollen, but soft, elastic, and cushion-like; the os uteri loses in some degree its defined form, and is dilatable; the canal through the cervix, during the early months, is closed by the glutinous secretion of the follicles, and these glands are themselves enlarged, so as occasionally to be felt rolling under the finger.

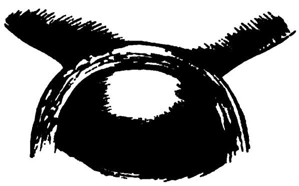
During the first three months, the os uteri is lower than usual in the pelvis, owing to the increased weight of the uterus, and directed a little more forwards; as the uterus rises above the brim of the pelvis, it is directed backwards, and after the fifth month, the cervix is said to be drawn out by the expanding uterus, and shortened. At the sixth month it is said to lose one-fourth of its length (fig. 51); at the seventh it is only half its original length; at the eighth it loses another quarter (fig. 52); and at the ninth the neck is obliterated (fig. 53): so that upon making an examination, we find the vagina closed superiorly by the rounded lower end of the uterus, but no protruding cervix. It would appear, however, that this shortening of the cervix is more apparent than real. Examined by the finger, it certainly protrudes less into the vagina, and its length is really somewhat less; but

Fig. 50.



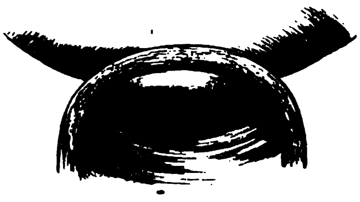
Cervix Uteri at three months.

Fig. 51.



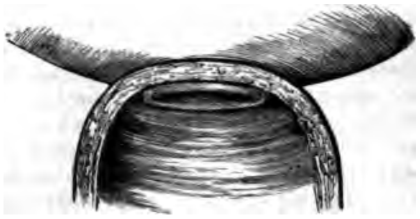
Cervix Uteri at six months.

Fig. 52.



Cervix Uteri at eight months.

Fig. 53.



Cervix Uteri at nine months.

this, according to the researches of Stolz, Cazeaux,[1] and Matthews Duncan, is not by distension of its cavity, but by approximation of its two extremities. The latter author[2] has given sectional outlines of the cervix uteri at different periods, made from dissection, and which appear to justify his conclusions. At the same time he states that the capacity of the canal becomes greater as pregnancy advances by an increase of breadth; that the length of the vaginal projection of the cervix diminishes as the uterus rises, as represented in the plates, and that the substance of the cervix becomes more soft and bulky. In these views Dr. Farre seems to coincide.

159. The *figure* of the uterus at the full term is oviform (fig. 48), the larger end being uppermost, and rounder in proportion than the lower end. Some variations in shape are observed from the pressure of neighboring parts. the position of the patient or of the fœtus. Occasionally the uterus stretches unequally, so as to constitute true obliquity, one side being more developed than the other. Such cases are not common, nor do we know much of their effect upon labor.

The axis of the uterus, at the end of gestation, is commonly more perpendicular than that of the brim of the pelvis; but this want of agreement is rectified at the time of labor by the uterine contractions which tilt the fundus forwards.

160. The *lining membrane* of the uterus participates in the general congestion of the uterus at the time of conception. It becomes turgid with blood; its villi, according to Von Baer, elongate, and over and between them is spread a thin layer of pulpy, semi-fluid matter, secreted by the mucous membrane: this is the *decidua* (fig. 54). It was noticed by Burton, but described particularly by W. Hunter, and called after him the decidua of Hunter. The pulpy matter, after a short time, acquires consistence, and, in its appearance and connection with the subjacent membrane, resembles the coagulable lymph thrown off by mucous membranes in a state of disease. It lines the entire cavity of the uterus, closes it inferiorly, and, according to John Hunter and Breschet, sends off a short process into the fallopian tube, through which, they conceive, the ovum descends.

Dr. Sharpey, of London, whose microscopical researches are so well known, on investigating the membrana decidua of a bitch, came to the conclusion that it was not a secretion from the lining membrane of the uterus, but that membrane itself altered and modified.[3] It appears that W. Hunter regarded the decidua as the mucous membrane modified, and this view has also been put forth by Bischoff. Having had the opportunity of examining the uterus of a woman supposed to have been impregnated about three weeks before death, he was enabled to demonstrate quite satisfactorily that the membrana decidua in the human female, as in the bitch, is merely the ordinary mucous membrane of the uterus considerably developed, and that it consists essentially of enlarged uterine follicles and their blood-vessels, together with an unusually large quantity of secretion which these follicles have poured out. The internal surface of the uterus presented an appearance quite different from its ordinary one, being finely villous; and this was especially evident on placing it in water, or examining perpendicular sections of it. The surface itself, when looked upon from above, appeared as if perforated by a number of small apertures, or covered with numerous white points, and these, when examined by the microscope, were found to be openings of cylindrical glandules. These glandules or follicles were from 1½ to 2 Paris lines in length, were held together by a transparent material, and terminated each by a blind extremity which rested on the fibrous tissue of the uterus. They ran a somewhat wavy course, but never branched or anastomosed. Previous to impregnation it seems to be exceedingly difficult to discover these glands in the mucous membrane of the uterus. Probably they then exist in a very undeveloped state, but immediately on the occurrence of conception increase rapidly, and exude an abundant secretion. Of these glands and their secretions (together with blood-vessels) the membrana decidua and, later on, the placenta essentially consist. The statement that a membrana decidua exists in the fallopian tube as well as in the uterus, in cases of fallopian impregnation, Bischoff combats by observing that so far as has yet been seen, the lining membrane of the fallopian tube contains no glands by which the formation of a structure corresponding to an ordinary membrana decidua could be effected.

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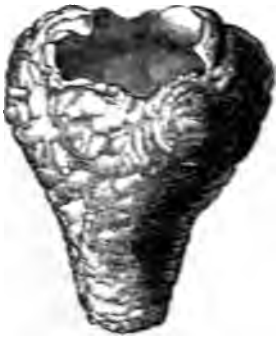
[1] Midwifery, p. 108, Amer. Trans.

[2] Edin. Med. Journ., March, 1859.

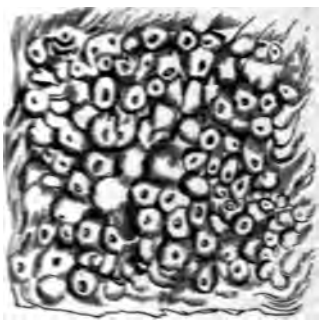
[3] Müller's Physiology, by Baly, part iv. p. 1578.

Fig. 54.



Decidua Vera.

Fig. 55.



Decidual Cotyledons.

A similar view to the above, with regard to the membrana decidua, was advocated also by M. Coste[1] some years ago, and since by M. Cazeaux, and recently repeated before the Academie des Sciences, Paris; and it is held, with some modifications, by those who, with Cruveilhier, Fergusson,[2] T. Smith, believe that, after delivery, the muscular structure of the uterus is denuded of mucous membrane. It has always appeared to me that this point is far from being proved, and I see, by Dr. J. Matthews Duncan's paper,[3] that his investigations have led him to the conclusion that the mucous membrane is not thrown off, except at the part to which the placenta is attached.

The decidua is rough externally at an early period, and smooth internally; and so far resembles serous membranes, that it is a shut sac, and contains a small quantity of fluid. Its color is reddish or whitish grey. Its thickness varies in different places; it is thicker near the placenta, and thinner near the cervix uteri: it also becomes thinner after the third month, in proportion as pregnancy advances. It adheres but loosely to the mucous membrane at an early period, but firmly during the latter months, so much so that Von Baer states that it cannot be separated without bringing away the lining membrane also; this, however, is not always the case. The medium of its connection with the uterus is chiefly the small vessels which are supplied to it by that organ, and which are arranged in loops round its villi; they are very numerous near the placenta, but more scanty at the cervix.

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[1] Archives Gén. d'Anatomie Gén. et de Physiologie, Sept. 1846. London Med. Gaz., Nov. 1850.

[2] On Puerperal Fever, p. 76, et seq.

[3] British and Foreign Med.-Chir. Review, Oct. 1853, p. 506.

161. A very important observation on the structure of the *decidua vera* has been made by Dr. Montgomery, in his valuable work On the Signs of Pregnancy. "Repeated examinations," he remarks, "have shown me that there are on the external surface of the decidua vera (fig. 55) a great number of small cup-like elevations, having the appearance of little bags, the bottoms of which are attached to, or imbedded in, its substance; they then expand or belly out a little, and again grow smaller towards their outer or uterine end, which in by far the greater number of them is an open mouth when separated from the uterus; how it may be while they are adherent I cannot at present say. Some of them, which I have found more deeply imbedded in the decidua, were completely closed sacs. Their form is circular, or nearly so; they vary in diameter, from the twelfth to the sixth of an inch, and project about the twelfth of an inch from the surface of the decidua." In a note, Dr. Montgomery suggests that these "decidual cotyledons" serve "as reservoirs for nutrient fluids separated from the maternal blood, to be thence absorbed, for the support and development of the ovum."

162. Those who hold the membrana decidua to be a distinct secretion, suppose that when the ovum arrives at the uterine extremity of the fallopian tube, it must either push the membrana decidua before it, or pierce it, in order to enter the cavity of the uterus. Opinions have been much divided as to which of these two operations takes place: Dr. W. Hunter, Dr. R. Lee, and M. Breschet say that the ovum passes into the sack of the decidua; but Lobstein, Burdach, Velpeau, and others, conceive that the sac remains entire, but that the ovum passes behind it to the situation where it fixes itself, and that its free surface (that part I mean which is not in contact with the uterus) is covered by the displaced decidua, to which the name of *decidua reflexa* has been given, to distinguish it from the *decidua vera*, and which was first observed by Dr. W. Hunter. As the ovum expands, so does the decidua reflexa, until at the end of gestation its inner surface is in contact with the inner surface of the decidua vera, just like (if I may be pardoned a very homely simile) the layers of a double night-cap when put on the head. That space of the uterine parieties from which the decidua was detached by the ovum, increases with the enlargement of the uterus, and is occupied subsequently by the placenta; but between this organ and the uterus a new layer of membrane — the *decidua serotina* — is deposited, resembling the decidua vera, to which it is united at the circumference of the placenta.

A third view is held by those who, like Dr. Sharpey, MM. Bischoff and Coste, regard the membrana decidua as nothing but the hypertrophied mucous membrane of the uterus. They consider that the fallopian tubes open freely into the uterine cavity, and that the ovum, on entering the uterus, becomes buried in the mucous membrane by which it is covered. As the ovum increases, the hypertrophied membrane is distended, and forms what is termed the decidua reflexa. As far as I understand, they seem to say that the ovum divides the mucous membrane into two layers — an outer and an inner—answering to the decidua reflexa and the placenta decidua, whilst the remainder answers to the decidua vera.

The decidua reflexa becomes thinner as pregnancy advances, and is ultimately expelled, more or less entire, with the fœtal membranes, whilst the decidua vera may remain for some time, and be then discharged in shreds with the lochia.

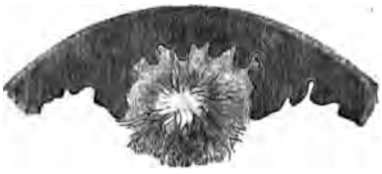
163. We know that the decidua exists before the descent of the ovum, and is therefore independent of it; and it is stated by most authorities, that in

cases of double uterus, both contain decidua, and in extra-uterine fœtation the uterus is lined by decidua. There are, however, exceptions to the latter; for in the cases published by Dr. R. Lee[1] the decidua surrounded the ovum in the tube, and was not present in the uterus.

[We shall endeavor to render the formation of the decidua reflexa, according to the views entertained by modern physiologists, somewhat clearer than does the description given of it by the author.

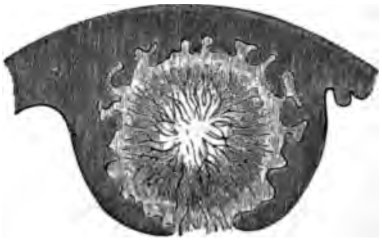
When the impregnated ovum is about to descend into the cavity of the uterus, the mucous membrane of the entire body of the latter takes on an increased activity of growth and a special development. It becomes tumefied and more vascular; and as it increases in thickness, its surface is formed into rounded, projecting eminences or convolutions. When the fecundated ovum passes through the lower orifice of the fallopian tube, it insinuates itself between the opposed surfaces of the lining membrane of the uterus, and soon afterwards becomes lodged in one of the furrows or depressions between the above-described projecting convolutions of the internal thick, rich, soft, vascular, velvety lining of the uterus, which is the decidua vera. It is at this situation that an adhesion is subsequently to take place between the external membranes of the ovum on the one hand, and the uterine mucous surface, or decidua, on the other. At the point where the ovum becomes thus arrested and entangled, a still more rapid development than before takes place in the uterine mucous membrane. Its projecting folds begin to grow up around the ovum in such a manner as partially to enclose it in a kind of circumvallation of the uterine membrane, and to shut it off, more or less completely, from the general cavity of the uterus. It is thus soon contained in a special cavity of its own, which still communicates for a time with the general cavity of the uterus, by a small opening, situated over its most prominent portion. As the growth of the mucous membrane around the ovum goes on, this opening becomes gradually smaller, until, finally, the projecting folds of mucous membrane touch each other and unite, forming a kind of cicatrix, which remains for a certain time to mark the situation of the original opening. The ovum has now become completely enclosed in a distinct cavity of its own, being everywhere covered with a decidual layer — an outgrowth of the altered mucous membrane of the uterus, and by which it is concealed from view when the uterine cavity is laid open. This newly-formed layer of decidua, enveloping, as just described, the projecting portion of the ovum, is called the *decidua reflexa*, because it is reflected over the ovum by a continuous growth from the general surface of the uterine mucous membrane. It gradually grows larger and larger, as

Fig. 56.



First stage of the formation of the *Decidua reflexa* around the Ovum.

Fig. 57.



More advanced stage of *Decidua reflexa*.

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[1] Med. Gazette, June 5th. 1840.

the ovum becomes developed in size, until, finally, it comes in contact at its external surface with the entire mucous coat lining the cavity of the uterus.

The decidua vera, agreeably to the views here set forth, is the original mucous membrane lining the surface of the uterus; while the decidua reflexa is a new formation, which has grown up around the ovum and enclosed it in a distinct cavity. For a full exposition of this subject, we would refer the reader to Dalton's Human Physiology, page 516 et seq.]

164. *Abnormal deviations.*—The decidua occasionally exhibits the effects of inflammation; it may be hypertrophied or increased in thickness by layers of adventitious membrane, and pus has been found on its surface. In its substance calcareous depositions and spiculæ of bone may sometimes be detected. It may adhere firmly to the lining membrane of the uterus, and persisting after delivery, may constitute the nucleus of a mole, etc.

165. We have seen that, on leaving the ovary, the ovum is received into the fallopian tube; that its further transmission is effected by muscular motion and the ciliary movements of the villi of the mucous membrane; and that there is reason to believe (judging from the ovum of the rabbit) that in its passage through the tube, an additional covering is developed.

It is difficult to determine the period (even if it be regular) at which the ovum arrives in the uterus. One thing appears certain; that several days elapse from the moment of impregnation. One of the earliest ova on record is that described by M. Velpeau (fig. 58, natural size; fig. 59, opened and magnified), which could not have been more than fourteen days old, unless the midwife who gave it to him, and who was herself the subject of the miscarriage, deceived him; and she appears to have had no reason for so doing.[1]

Fig. 58.

Human Ovum of two weeks.

Fig. 59.

Human Ovum of two weeks, laid open.

166. When the ovum arrives at the uterus, it consists of two membranes, the *chorion* and *amnion*; in the interspace between which is contained the *vesicula alba* or *umbilicalis*, and a *gelatinous substance* — the *tunica media* of Bischoff. Internal to the amnion, we find the *liquor amnii*, and the *embryo*. Each of these parts we shall now examine in detail.

167. The CHORION is the outer envelope proper to the ovum, and corresponds to the membrane lining the egg in oviparous animals. It is found covering the ovum at the earliest period at which this has been seen in the uterus, surrounding it loosely, and forming a shut sac. It is smooth on its inner surface, but externally it is covered over with short cylindrical villi. As the ovum advances in age, these villi diminish in number, assume a vesicular appearance, and terminate in delicate rounded extremities. The interspaces are larger and more smooth. About the beginning of the second month the villi divide into branches, which arise from short thin stems, and terminate either in thin filiform or vesicular enlargements. The process of

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[1] Dr. Allen Thompson has given an excellent notice of early ova, observed by himself and others, in the Edin. Med. and Surg. Journal, vol. lii. p. 119, to which I beg to refer the reader.

obliteration thus commenced, continues until no villi remain, except at that part of the chorion which is in contact with the uterus; the other part presenting the appearance of a thin, colorless, transparent membrane.

The umbilical cord is inserted into some part of the inner surface of the chorion, and the part of the outer surface which corresponds to this insertion, is always that which comes in contact with the uterine parietes, and upon which the placenta is formed.

The chorion may be divided into two laminæ, especially where it covers the placenta; the outer is called the *exochorion*, the inner the *endochorion*; by Burdach, who believed the latter to be the vascular layer of the allantois. From the endochorion, according to Bischoff, are derived the vessels which run to the villi. The chorion itself appears to be destitute of vessels, unless, as Dr. W. Hunter suggested, we regard as such the white filaments observed near the edge of the placenta. The intimate structure of the membrane is cellular, and in many places bears a strong resemblance to that of vegetables, each cell containing a distinct nucleus; the villi participate in the same texture, but their cells are filled with a granular matter.

The strength of the membrane is greatest in early ova; at the termination of pregnancy it is considerably weaker than the amnion: at an early period it is equally strong in all parts, but afterwards it is stronger near the placenta. It is covered externally by the decidua reflexa, and internally it is separated from the amnion by a layer of gelatinous matter, which is afterwards condensed into a thin membrane, called *tunica media* by Bischoff, who first described it.

168. *Abnormal deviations.*—Inflammation may attack the membrane, giving rise to vascularity, opacity, thickening,[1] or the effusion of fluid between it, and the amnion. Occasionally false membranes are deposited upon it, and the villi may be the seat of hydatids. Dr. Montgomery has a preparation in his museum, in which the cord is inserted into the part of the chorion covered by the decidua reflexa, instead of into that attached to the uterus. The fœtus, of course, perished for want of nourishment. Hemorrhage sometimes occurs into the space between the chorion and amnion.

169. I have already mentioned that during the first months of gestation, an albuminous or gelatinous mass of varying consistency is found between the chorion and amnion. It is often mixed with flocculi, or threads, and occasionally presents a reticulated appearance. "When put into spirits," Wagner observes, "this mass assumes the appearance of the cellular tissue that is found between the muscles, and seems, in fact, to bear the same relation to the amnion and the chorion as the intermuscular cellular membrane does to the fasciculi between which it lies." The space it occupies is, in early ova, considerable, but it gradually diminishes as the two membranes approximate, and in proportion the interposed matter is condensed into an extremely delicate membrane, like the arachnoid, termed by Bischoff and Wagner the *tunica media*. By Velpeau it is called the "*corps réticulare*," and he considers it to be the allantois; but this opinion is rejected by other physiologists.

170. The **Vesicula Alba**, or *umbilical vesicle* (fig. 63), is also contained in the interspace between the amnion and chorion. According to modern investigations, it is constantly present as a normal formation in the earlier months of gestation, and is connected with the intestinal canal of the fœtus. It is, in fact, the vitellus, surrounded by the blastoderma, upon which the embryo is first formed, and it bears a perfect analogy to the yelk of the egg, except that it is not ultimately enclosed within the abdomen of the fœtus. In very early ova, it is large in proportion, of a rounded or oval

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[1] Dr. Montgomery, Dub. Hosp. Gaz., March 15, 1857.

form, and lying upon the intestine, with which it communicates. In a short time, however, the inner end becomes narrow, and forms a pervious canal, or duct, through which its contents may be transmitted. M. Velpeau found it pervious in almost every ovum of six weeks old that he examined; and he states that he not only saw vitellary matter in the intestine, but that he could push the fluid from the vesicle through the duct into the intestine. The length of the duct varies in different ova, and its calibre diminishes as gestation advances, until, in the second month, it is impervious and thread-like, but may still be traced to the loop of intestine contained in the sheath of the umbilical cord. The vesicle contains a yellowish-white or yelk-colored fluid, in which numerous globules are suspended. Its parietes consist of two laminæ, an external vascular, and an internal mucous layer. It possesses two vessels, the omphalo-mesenteric artery and vein, which ramify upon its surface and on the duct. As gestation advances, the vesicle is emptied, shrinks, and remains flat and collapsed to the termination of pregnancy.

Its *use* is evidently to contain nutriment for the fœtus, before the development of the placenta.

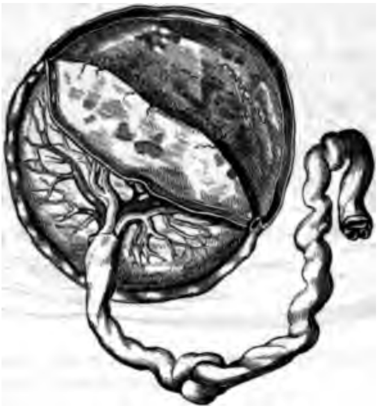
171. The AMNION (fig. 63). — In the quotation from Dr. Barry's paper (§ 146) descriptive of the changes which take place in the ovum after impregnation, it will be remembered that the amnion was stated to be formed by the coalescing of the layer of small vesicles formed on the inner surface of the membrane which invests the yelk, with the "mulberry-like structure formed in the centre of the yelk, but passing to its circumference." M. Coste calls the amnion a "true epidermis of the blastoderma," and states that it is detached from the external surface of the embryonic spot. The membrane thus formed envelopes the embryo very closely at an early period, and is continuous with the common integument of the fœtus, at the open abdominal parietes. At a later period, it is distended with fluid, and so separated from the fœtus; and after being reflected upon the funis, of which it forms the outer coat, it terminates at the umbilicus. In the progress of gestation, the amnion approaches the chorion, until, at last, it is in contact with it or rather with the tunica media. It is thin and transparent, but of a firm texture, resisting laceration much more than the other membranes. Its external surface is somewhat flocculent, but internally it is quite smooth, like serous membrane, and like it, secretes a bland fluid. Neither vessels nor nerves can be demonstrated in the amnion in a state of health, though it may be presumed to possess them.

172. *Abnormal deviations.* — The researches of M. Mercier have established the fact that this membrane may be the seat of inflammation, and that in such cases it becomes vascular, and secretes a disproportionate quantity of fluid. It is not quite certain whether its quality is changed from diseased action. The membrane may also become thickened and opaque.

173. The PLACENTA. — Let us now consider the chorion at a more advanced period of gestation, and we shall find that a new organ has been developed on that part of it which is in contact with the uterus. This organ was first called the *placenta*, I believe, by Fallopius; it is a spongy vascular mass, existing in some form in all mammalia, as an appendage of the chorion. It is of considerable size at the termination of utero-gestation, its diameter being six or eight inches, its circumference eighteen or twenty-four, and its thickness from one inch to one and a half. In general it is of a rounded or oval form. Internally, its surface is smooth and shining, from its being covered by the chorion and amnion, beneath which the radiations of the umbilical vessels may be discovered. The chorion, which covers its inner surface immediately, is firmly attached to it, and sends

processes between its lobes and lobules, whilst the amnion, lying over the chorion, is but loosely attached. The outer or uterine surface, if the placenta be "*in situ*" or removed carefully, is uniform and level, though not exactly smooth, being covered by the *decidua serotina*; if this be peeled off, the lobes and lobules into which the placenta is divided, are evident, and we find processes of the decidua serotina, entering these divisions. The vessels of one lobe have very rarely any direct communication with those of another.

Fig. 60.



Placenta and Cord.

174. As to the *formation* of the placenta, we observed that the villi of the chorion diminish gradually in number, and finally disappear from every part of its surface, except where it is in contact with the uterus, at which part they become, as it were, concentrated, and grow with great luxuriance, in consequence of the development within them of vessels derived from the inner layer of the chorion (the endochorion), or from between the two layers. These vessels go on enlarging and multiplying, interlacing and anastomosing with each other, until they, with their connecting (or separating) sheaths of villi or decidua serotina, form the mass of the placenta. The vessels are divided into arterial and venous branches. The two umbilical arteries, at their insertion into the internal surface of the placenta, divide and subdivide into radiating branches, which, plunging into its substance, are minutely divided and distributed to the different lobes. It is generally stated that the ultimate radicles of the arteries terminate directly in the radicles of the umbilical vein, without the intervention of capillaries; but there is room for doubt upon this point The radicles of the umbilical vein coalesce, until the large vessels formed by them unite in forming the umbilical vein, which is enclosed in the sheath of the funis umbilicalis with the arteries. The arteries are extremely tortuous, and the veins are without valves. It may be doubted whether the placenta is supplied with nerves, but it is pretty certain that it possesses lymphatics.

["The formation of the placenta commences by the penetration of the ramified villi, or filamentous processes of the chorion, into the tubuli of the decidua; the villi thus serve as roots, which suck up and convey to the embryo the nourishment secreted for it by the maternal structures."[1]]

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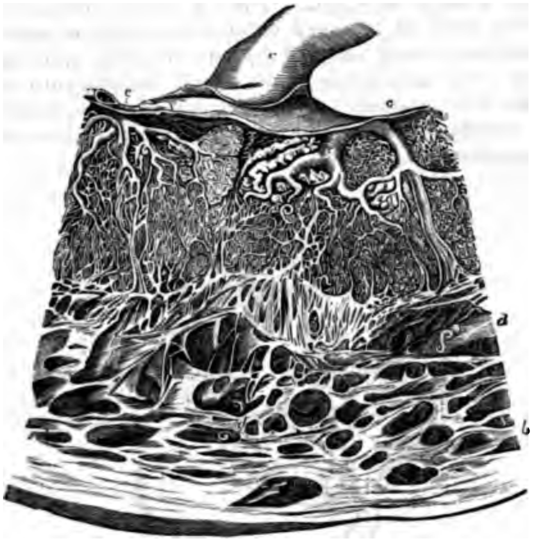
[1] [Carpenter's Human Physiology, p. 603. For a very clear account of the formation of the placenta, we would refer the student to Dr. Dalton's "Treatise on Human Physiology," p. 523, et seq.]

[Fig. 61.]



Section of a portion of a fully-formed *Placenta*, with the part of the Uterus to which it is attached:— *a*, umbilical cord; *b*, *b*, section of uterus, showing the venous sinuses; *c*, *c*, *c*, branches of the umbilical vessels; *d*, *d*, curling arteries of the uterus.

175. The *situation* of the placenta may be ascertained with tolerable accuracy, by the use of the stethoscope before delivery, and the examination of the perforation in the membranes afterwards. By some writers it is stated to be at the fundus, or a little on one side of it; by others at the posterior or anterior surface: it would seem, from the researches of M. Naegelè, jun., to be most frequently on the left side; next, on the right side of the uterus. He states that the stethoscope indicated the placenta to be attached to the left side, in two hundred and thirty-eight cases out of six hundred; and to the right side of the uterus, in one hundred and forty-one cases. In twenty no sound was perceptible; in one hundred and sixty it was weak, or diffused so as to be uncertain; in seven the placenta was attached to the fundus; in thirteen to the anterior wall; and in eleven cases there was placental presentation.

176. A much-controverted question now demands our attention: viz., Whether there be direct vascular communication between the placenta and uterus? and if not, how is the aëration of the fœtal blood effected? I am afraid we cannot as yet decide the point in dispute. It was for a long time believed that the blood-vessels of the uterus and placenta communicated with each other, and that an interchange of blood took place, so that the fœtus obtained fresh blood from the mother for its own nutrition. This opinion was supported by Cowper, Noortwyk, Haller, Senac, and in modern times by Flourens.

177. The researches of the Monros, Hunters, Wrisberg, and others, however, very satisfactorily disproved the existence of this vascular continuity. The labors of the Hunters, in particular, threw great light upon the anatomical relations between the blood-vessels of the mother and fœtus. "They satisfied themselves," says Dr. J. Reid, in his paper,[1] "that the umbilical arteries terminate in the umbilical veins, and not in the vessels of the uterus;"

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[1] Edin. Med. and Surg. Journal, No. 146.

and that the blood in the umbilical arteries "passes from them into the veins, as in other parts of the body, and so back again into the child." They further observed, that numerous small curling arteries, the largest being about the size of a crow-quill, passed from the inner surface of the uterus, that they penetrated the decidua, and opened into the interstices between the fœtal blood-vessels of the placenta. Prolongations from the uterine sinuses were also traced through the decidua, and were observed to terminate in the placenta in the same manner as the curling arteries, so that "in the umbilical portion of the placenta, the arteries terminate in veins by a continuity of canal; whereas in the uterine portion, there are intermediate cells, in which the arteries terminate, and from which the veins begin. It was therefore concluded, that the blood of the mother was poured by the curling arteries into a kind of cellular tissue, filling up the intervals between the ramifications of the fœtal placental vessels, from which it returned to the uterine sinuses of the mother through their placental prolongations, after having acted upon the blood of the fœtus through the thin walls of the umbilical placental vessels."

178. Lauth, Velpeau, Seiler, Coste, Radford, Ramsbotham, Millard, Noble, etc., agree with the former opinion of Dr. R. Lee, doubting the existence of these utero-placental vessels, and assume that the placenta is to be considered exclusively as the fœtal organ. Dr. R. Lee now believes that there is a direct communication between the uterine vessels and the cavernous structure of the placenta.[1] Dutrochet's theory of endosmose and exosmose has been adduced to explain the nature and process of the interchange of blood, but I do not believe that it is considered satisfactory by many persons.

179. The investigations of Weber, Eschricht, Owen, and Reid, seem rather to carry us back to a modification of the opinions promulgated by the Hunters. According to Weber, the large vessels which leave the uterus to pass into the decidua are deprived of all except their innermost tunics, which are as soft and tender as coagulated lymph. The veins form a network, and have this peculiarity, that they become wider the more deeply they penetrate between the lobules. Thus the veins themselves form cells or sinuses, into which the fœtal villi project. The delicate and yielding coat of the vein is borne inwards by each villus pressing upon its exterior, and so is itself the covering of all the villi which compose the fœtal lobules, and which seem to project into its exterior. Eschricht supposes that the utero-placental vessels divide and subdivide in the placenta like the arteries and veins in the other parts of the body. Wagner, in his Physiology, agrees pretty nearly with Weber, and describes the utero-placental vessels as winding like a network around the tufts of the chorion containing the vessels of the embryo.

The last author to whom I shall refer is the late Dr. J. Reid, from whose essay I have already quoted, and whose industry and acumen obtained for him a distinguished place among the physiologists of the present day.[2] In August, 1840, he carefully examined the uterus of a woman who had died in the seventh month of pregnancy. "On separating the adhering surfaces of the uterus slowly and cautiously under water, I satisfied myself, but not without considerable difficulty, of the existence of the utero-placental vessels described by the Hunters. After a portion of the placenta had been detached in this manner, my attention was attracted towards a number of rounded bands passing between the uterine surface of the placenta and the inner surface of the uterus. These bands were generally observed to become elongated, thinner, and of a cellular appearance, when put upon the stretch, and were easily torn across; while at other times, though much more rarely, they could be drawn out in the form of tufts from the mouths of the uterine sinuses. On slitting up some of the uterine sinuses with the scissors, these tufts could be seen ramifying in their interior, and were more or less elongated; many of them appearing only to dip into the open mouths of the sinuses, while others proceeded from a quarter of an inch to an inch from the open mouths of the sinuses by which they had entered, and in some cases they extended themselves into one of the neighboring sinuses." The parts were then injected, as well as was possible, and when the branches of the tufts contained in the uterine sinuses were filled with injection, "their continuity with the umbilical placental vessels was clearly ascertained;" and an examination with the microscope proved their identity with the umbilical vessels in the placenta. As to their anatomical relations to the sinuses: "these tufts were found to protrude into the open mouths of certain of the uterine sinuses only; and it need scarcely be added, that they were observed only in those sinuses placed next the inner surface of the uterus, and not in any of the deeper sinuses. These tufts were surrounded externally by a soft tube, similar to the soft wall of the utero-placental vessels, which passed between the margin of the open mouths of the uterine sinuses and the edges of the orifices in the decidua, through which the tufts protruded themselves into the sinuses. The size of these tufts varied considerably. Some of them appeared to fill up completely the open mouths of the sinuses by which they entered, while others filled them only partially. On examining these tufts as they lay in the sinuses, it was evident that, though they were so far loose, and could be floated about, yet they were bound down firmly at various points by reflections of the inner coat of the venous system of the mother upon their outer surface." "In this uterus we ascertained that while some of the utero-placental veins contained no prolongation of the fœtal-placental vessels, in others these passed along their interior, and projected into the uterine sinuses. On tracing those utero-placental veins which contained no fœtal vessels, as far as the placental surface of the decidua, the inner coat of the venous system was seen to be prolonged upon some of the tufts of fœtal-placental vessels in their immediate neighborhood. On tracing one of the larger of the curling arteries through the decidua, it was also observed, that when it reached the placental surface of that membrane, the inner coat of the arterial system of the mother was prolonged upon some of the tufts of the fœtal-placental vessels which projected into their orifices. Those numerous branches of the fœtal-placental vessels which reach the placental surface of the decidua, and do not pass into the uterine sinuses nor into the orifices of the utero-placental vessels, are attached by their apices to the placental surface of that membrane." After an elaborate description of the structure of the tufts and vessels of the placenta, Dr. Reid observes, "the interior of the placenta is thus composed of numerous trunks and branches (each including an artery and an accompanying vein), every one of which, we believe, is closely ensheathed in prolongations of the inner coat of the vascular system of the mother, or *at least with a membrane continuous with it.* If we adopt this view of the structure of the placenta, the inner coat of the vascular system of the mother is prolonged over each individual tuft, so that when the blood of the mother flows into the placenta through the curling arteries of the uterus, it passes into a large sac formed by the inner coat of the vascular system of the mother, which is intersected in many thousands of different directions, by the placental tufts projecting into it like fringes, and pushing its thin wall before them in the form of sheaths, which closely envelop both the trunk and each individual branch composing these tufts. From this sac the maternal blood is returned by the

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[1] Lectures on the Theory and Practice of Midwifery, p. 136.

[2] May I be excused, going so far out of my way as to recommend most cordially to my brethren the admirably-written life of this eminent physiologist, by Dr. George Wilson.

This book is the p
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utero-placental veins, without having been extravasated, or without having left her own system of vessels." "The blood of the mother contained in this placental sac, and the blood of the fœtus contained in the umbilical vessels, can easily act and react upon each other through the spongy and cellular walls of the placental vessels and the thin sac ensheathing them, in the same manner as the blood in the branchial vessels of aquatic animals is acted upon by the water in which they float." These ample quotations will, I believe, give the reader a just view of Dr. Reid's observations and opinions, and I may add, that on visiting Edinburgh, Dr. Reid had the kindness to show me one of the portions of uterus and placenta on which his investigations were made, and there was no difficulty in demonstrating the tufts dipping into the uterine sinuses. No doubt further observations are necessary for the perfect elucidation of the subject; but I certainly think that, as far as our knowledge extends, it is in favor of the opinion adopted by Dr. Reid and the later physiologists.

180. *Abnormal deviations.*—The placenta is liable to malformations and displacements, and to a series of diseases, some of which have been ably described by my friend Professor Simpson of Edinburgh,[1] Mr. Bremner,[2] and Dr. Elkington, and others.[3]

1. It may be the seat of sudden or gradual congestion, ending in resolution or in effusion of blood "into the substance of the organ, upon its uterine or fœtal surfaces, or between the membranes." Dr. Simpson suggests, that perhaps the so-called tumors, tubercles, or white spots, etc., of the placenta, of various authors, may in fact be coagula of blood in various stages of transformation. The symptoms to which placental congestion and apoplexy give rise, depend for their clear manifestation upon the extent of the hemorrhage. In moderate cases, there is a degree of uneasiness and weight in the region of the uterus, and sometimes a fixed or intermittent pain, which may extend down the thighs. When the hemorrhage is severe, it will be attended by the usual symptoms of loss of blood. The result to the fœtus in many cases is death, and thus the congestion may cause abortion.

2. Inflammation may attack the placenta, either in its parenchyma or membranes, or all together, and it may either affect one lobe only, or several at the same time. It may issue in the effusion of lymph, either into its substance or upon its fœtal or uterine surfaces. In the former case we have the yellow induration of the placenta; in the latter, adhesions between the uterus and placenta; and, when the fœtal surface is the seat, there may be increase of the liquor amnii, lymph on its surface, or, possibly, adhesion to some part of the fœtus. Another termination of placentitis is in the production of purulent matter, in the substance or upon the surfaces of the placenta. The most constant symptom of placentitis is pain in the uterine or lumbar regions, and, in some cases, violent vomiting; in others, rigors, succeeded by febrile symptoms. Inflammation of the placenta may cause the death or malformation of the embryo, and place the mother in some danger. For more minute details, I beg to refer the reader to Dr. Simpson's learned essay.

3. The placenta may be hypertrophied or atrophied in part or the whole of its substance.

4. From the researches of Kilian Barnes,[4] Hassall,[5] Barlow,[6] Cowan, and Druitt,[7] it appears that the vessels of the placenta may undergo fatty degen-

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[1] Edin. Med. and Surg. Journal, vol. xlv. p. 265.
[2] Ibid., vol. lxxii. p. 56.
[3] Prov. Med. and Surg. Journal, May 30th, 1849.
[4] On Fatty Degeneration of the Placenta, etc., Med.-Chir. Trans., vols. xxxiv. and xxxvi.
[5] Microscopical Anatomy.
[6] Med. Times and Gazette, Oct. 30th, 1852, p. 432.
[7] Med.-Chir. Trans., vol. xxxvi. p. 99.

eration, just as the small vessels of the lungs or other parts. Dr. Hassall observes that "in the placenta affected with fatty degeneration, certain of the lobes, in place of presenting the red spongy texture of healthy tissue, exhibit a fatty appearance, and are of a yellow color, glistening, firm, and exsanguine, while the remaining lobes present their ordinary characters, at least to the unaided eye." The minute alterations which he has detected are as follows: "1. We observe that the villi are thickly studded with innumerable spherules of oil. 2. The chorion is much altered, it is thickened and destitute of nuclæi. 3. The walls of the vessel no longer contain nuclæi; these having, in all probability, become degenerated into spherules of oil. 4. The spherules of oil are contained, some in the chorion, some in the walls of the blood-vessels, and many in the intervals or spaces between them. 5. The cavities of the vessels are almost invariably free from fatty deposition. 6. The vessels are destitute of blood." No doubt that so far as it extends, this change is destructive to the functions of the organ; but it does not follow that the remaining healthy portion may not be adequate to the complete nutrition of the fœtus. Mr. Barlow remarks very justly, that placental apoplexy may be owing to this fatty degeneration of the vessels. Dr. Druitt and others regard this change as a natural rather than a morbid process; that it is in fact the mode of death of a temporary organ, whose functions are about to terminate.

5. It may be the seat of cartilaginous or calcareous degeneration, or of other morbid products.

6. It may give rise to hydatids.

181. The Umbilical Cord, *funis or navel-string*, is the connecting link between the fœtus and placenta (fig. 60), terminating with the functions of the latter at birth. It is visible at the earliest period of pregnancy. It arises from the centre of the placenta most frequently, but occasionally from its edge (battledore placenta), and is formed by the umbilical arteries and vein, embedded in (the Whartonian) gelatine, and enclosed within a sheath of the chorion internally, and of the amnion externally. Besides the vessels, it contains the duct of the umbilical vesicle and the urachus, the omphalo-mesenteric vessels, and, at an early period, the fœtal intestines at its fœtal extremity. At first, the cord is thin and cylindrical, the vessels running a straight course through it; from the third to the ninth week, it appears to be divided by two or three vesicular swellings, which ultimately disappear. After this time, the vessels run in a spiral form, the arteries around the vein, from left to right, and form in their course a number of small loops or knots. The vein has no valves, and its calibre is equal to that of both the arteries. The cord is also supplied with lymphatics, as has been proved by the injections of Fohmann and Montgomery. It is probable, though not as yet demonstrated, that it may possess nerves also.

The length of the cord varies much; it is very rarely less than eight inches, though such cases are on record, and it is sometimes five or six feet long. Out of 500 cases, selected from the writings of Osiander, Adelmann, and Henne, with some additional measurements of my own, I find the most common length to be eighteen inches; none were under twelve, nor above fifty-four inches. Dr. Storer has found the most common length to be two feet; next, twenty-six inches; next, twenty-three inches; the shortest was four and a half inches, and the longest forty-three. Dr. G. Thompson, of Boston,[1] mentions one of five feet nine inches; Mr. Rouse one of fifty-one and a half inches, which was coiled six times round the neck;[2] and Dr. Tyler Smith, one of fifty-nine and a half inches.

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[1] Boston Med. and Surg. Journal, vol. xlii., No. xxii. p. 451.

[2] The Lancet, Sept. 1, 1855.

[Abnormal shortness of the umbilical cord is by no means of such frequent occurrence as excessive length. As stated above, among 500 cases Dr. Churchill found it in no instance shorter than 12 inches. Mr. J. B. Thompson, however, relates a case in which the funis was only seven and a half inches long.[1] Mr. Stone has met with a case, in which the funis was still shorter, being only six inches; and Mr. Wm. Collyns,[2] another, in which the funis was scarcely that length.]

By most writers, the pulsation of the arteries of the cord is considered to be dependent upon the heart; but Osiander contends that they are to a certain degree independent, and some facts which he adduces appear to afford confirmation to his opinion.

After the birth of the child, the pulsation ceases in about fifteen or twenty minutes, and that portion of the cord which remains attached to the umbilicus, dies and gradually withers, until it falls off, in the majority of cases, on the fifth or sixth day.

In ordinary cases the funis lies free and loose in the cavity of the amnion, above the head of the child; but occasionally, owing to the movements of the child at an early period, it may be coiled round its neck, tied in knots, or escape below the head, so as to prolapse during labor. The coiling round the neck happens about once in nine or ten cases; or according to the examples I have collected, 204 times in 1920 cases. Dr. Weidemann states that in 28,430 deliveries there were 3230 cases of coiling round the neck, and 149 around other parts of the body. He attributes it to a long funis, abundant liquor amnii, and a small child.[3] It is commonly enumerated among the causes of delay in labor,[4] on account of the shortening of the cord which it occasions, and sundry other evil effects are attributed to it, which I believe to be altogether imaginary, for the coiling does not occur except when the cord is longer than usual, so as to leave enough of it free. For more minute details I take the liberty to refer the reader to an essay on the subject in my Researches on Operative Midwifery, etc.

182. *Abnormal deviations.*—1. The vessels of the cord may divide at some distance from the placenta: 2, instead of two arteries and one vein, there have been found two veins and one artery, one vein and one artery, or three arteries: 3, two cords have been attached to one placenta with a single child: 4, the cord may be tied in double or single knots: 5, the vessels are sometimes partially or wholly closed: 6, cases are on record of the absence of funis and umbilicus: 7, in an acephalous fœtus born in the Western Lying-in Hospital, we found the cord inserted into the neck, near the angle of the jaw, from whence the vessels passed down behind the clavicle and sternum, through the chest into the abdomen, where they were lost: 8, when the umbilical ring is imperfectly closed, the sheath of the cord sometimes contains a portion of the intestines: 9, in cases of twins, the placenta and cords are generally distinct, and without communication, but occasionally a cross branch passes from one to the other: 10, the cord may be inserted into a part of the chorion, covered by the decidua reflexa, instead of that part upon which the placenta is to be developed: 11, the cord may be so much twisted (at an early period) as to diminish the calibre of the vessels, and to impair the nutrition of the embryo: 12, the vessels may become varicose, or the sheath of the cord may contain hydatids: 13, the coats of the vessels may give way, and hemorrhage ensue: 14, the cord may be torn across, by the mother's falling or receiving a violent concussion.

183. The **Allantois** "arises on the fore part of the posterior extremity

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[1] [London Lancet, June 4, 1842. [2] Provincial Medical Journal, Aug. 6, 1852.]

[3] Med. Times and Gazette, July 18, 1857.

[4] Lee's Lectures on Midwifery, p. 121.

of the mucous layer which is closing to form the intestine, as a growth of the intestine, which proceeds very rapidly. It passes out where the ventral laminæ are still unclosed, in the region of the umbilicus, and in birds and mammalia reaches either mediately or immediately the inner surface of the exochorion. By the constriction of the navel it is separated into two portions, which communicate; that within the body of the embryo is the sacculated urinary bladder, with the urachus or tube of communication. It receives its vessels from the hypogastric, which are spread out as a vascular layer, especially upon that portion of its surface which faces the exochorion. According to Burdach (as we have seen) the vessels form a distinct layer, the endochorion." I have preferred quoting this concise description from an article in the Brit. and For. Med. Review, as giving a good account of the opinions held by most recent physiologists, to embarrassing the reader by a detail of the different hypotheses which have been broached upon the subject.

184. The **Liquor Amnii** is the name given to the fluid secreted by the amnion, and contained in its cavity. At first, it is small in quantity, clear and transparent; but afterwards it increases in quantity, and becomes slightly opaline. Dr. G. O. Rees has published in No. 6 of Guy's Hospital Reports, an analysis of some amniotic fluid which he obtained in a case where premature labor was induced. He found its specific gravity 1008·6, and in 1000 parts it contained

Of water	983·4
Of albumen, with traces of fatty matter	5·9
Albuminate of soda, chloride of sodium	6·1
Animal extractive, soluble in water and alcohol, urea, chloride of sodium	4·6
With traces of alkaline sulphate.	

Towards the end of gestation the albumen diminishes.

Professor Scherer has published an analysis of liquor amnii at the fifth month of gestation, and at the full time as follows: —

	At five months.	At nine months.
Water	975·84	991·474
Solids	24·16	8·526
Albumen	7·67	0·82
Extractive	7·24	0·60
Salts	9·25	7·06[1]

The amount at the full time varies from half a pint to several quarts; but the average quantity is about a pound. The fluid is usually stated, and I believe truly, to be a secretion from the inner surface of the amnion: but Meckel attributes it to the maternal vessels, especially in the earlier months.

The *uses* of the liquor amnii are very intelligible and important: 1, it is probable that it serves for nutriment to the fœtus, at least during the early months: 2, it preserves an equable temperature for it, during its intra-uterine life; 3, it diminishes the impression from sudden movements, shocks, etc., and thereby prevents injury: 4, during labor it protrudes the membranes, and is the primary agent in dilating the os uteri.

185. *Abnormal deviations* — It may be very scanty, or, in the opposite extreme, excessive. The latter deviation from its natural state is probably the result of inflammation, and occasions some mechanical inconveniences to the mother, and risk to the child during gestation, whilst at the time of labor it seems to enfeeble the uterus during the first stage. The quality of

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[1] Medical Times, Aug. 7th, 1851, from Schmidt's Jahrbücher, vol. lxvii. p. 7.

the fluid may be changed, though it rarely decomposes. Its color is sometimes yellow or brown.

186. The EMBRYO.[1] — If the reader will take the trouble to turn back to § 146, he will find that, in the quotation from Dr. Barry, the last change there described as occurring after impregnation, was the disappearance of the germ vesicle. When the vesicle bursts in the hen's egg, the formation of the *germ-membrane*, or *blastoderma* commences, according to Purkinje, and it is completed by the fifth day, according to Von Baer. In mammalia, however, it appears to exist previous to the bursting or disappearance of the vesicle: at least it is visible immediately the vitellus becomes transparent after that occurrence. Between this membrane and the chorion there is a thin layer of albumen, and at some point we find an aggregation of granules, forming the cumulus of the blastoderma. It is at this part that the embryo is developed, lying as it were upon the membrane. The form of the germinal membrane gradually changes, becoming more oval. It consists of three superimposed laminæ or layers, at least at the central point or cumulus; and upon this separation into layers rests the modern theory of development, as first proposed by Döllinger and Pander, and afterwards illustrated by Von Baer, Rathke, Burdach, etc. etc. "Above, and most extended," says the author of the very able article in the Brit. and For. Med. Review, from whom I have already quoted, "is the *serous* layer; below and least extended is the *mucous:* between the two, and later in its appearance, is the *vascular* layer. In one or other of these, as distinct primitive forms, there lies concealed that which is essential, in the different organs and tissues of which the body is composed, and in virtue of which they admit of being referred to distinct original groups. On the serous layer, arise the organs of animal life — the brain and spinal cord, organs of sense, skin, muscle, tendons, ligaments, cartilage, bone; on the mucous, the organs of vegetative life, the intestinal canal, lungs, liver, spleen, pancreas, and other glands. The heart and vascular system arise from the vascular layer, if this is to be considered as a separate one. To which division the generative system is to be primarily referred, is still undetermined." This is the view generally accredited, but Dr. Barry seems to think it doubtful. He has not observed this "splitting of the germinal membrane," nor does he conceive that the membranous layers originate the embryo, but the reverse: that the "previously-existing germ, by means of a hollow process, originates a structure having the appearance of a membrane."

In the centre of the blastoderma, where it is supposed to divide into the serous and mucous layers, there is observed a clear space, the *area proligera* or *pellucida,* in the centre of which and in the transverse axis of the vitellus, there is a mass of globules, loosely connected together, forming the *primitive streak* or *trace* of Von Baer, and around this the *area vasculosa* is developed. I may mention that these changes have been observed in the ova of different mammalia, as well as in the egg; and there is every probability that the human ovum undergoes identical mutations.

The appearance of the primitive trace is observed in eggs at about the fourteenth hour of incubation, and in the human ovum may probably be referred to the second or third week.

To proceed with the next changes: "The globules of the primitive streak seem next to be resolved, and then there is a change of appearances. On the sides of the streak are two *laminæ dorsales,* which bound a median furrow; and below this furrow is the *chorda dorsalis,* which is the axis of the future embryo, and the origin of the spinal column. That portion of fluid which separates the chorda dorsalis from the lamina dorsalis is the future cord and brain. The chorda dorsalis thickens at the fore part, to form the first appearance of skull, and the fluid between the dorsal laminæ is in larger quantity, in correspondence with it; so that the central parts of the nervous system and their coverings are laid down at the same time, and grow simultaneously. The separation between the spinal cord and brain is a very early one, and is coincident with a bending downwards towards the yelk, of the anterior part of the laminæ dorsales, which define the limit between the skull and column, brain and cord."

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[1] For a more minute account of the modern researches on the subject of embryonic development than I have been able to give, I must refer my readers to Drs. Baly and Kirke's Supplement to Müller's Physiology.

Next follows the closing of the laminæ dorsales over the fluid which is the rudiment of brain and cord. The brain, therefore, as Valentin remarks, ought not to be considered as growing from one end of the cord. "At first there is only a single cerebral vesicle; for in the brain, as well as in the cord, granules accumulate first on the periphery, the central part continuing to be fluid. The single vesicle is then elongated, and next appears constricted in certain regions, so as to form three cells, which communicate. The anterior cell corresponds to the cerebrum, the middle cell to the corpora quadrigemina and neighboring parts, and the posterior cell to the medulla oblongata and neighboring parts." "The deposit of granular matter which accompanies the further development of the brain and cord, is seen on that side of both which corresponds to the viscera, sooner than on that which corresponds to the spine."

"Two other laminæ (*laminæ ventrales* of Von Baer) are in the meantime proceeding from the axis of the embryo, one on each side They grow out laterally, and tend to converge in the median line, as did the dorsal laminæ; but they form a larger curve, and follow a different direction; that is, they converge to meet *below* the axis, and they do so meet, except in the umbilicus."

187. After the rudiments of organic life have been commenced in the central portion of the serous layer, a fold of its peripheral portion arches over the dorsal surface of the embryo, "so as to represent a sac whose opening is at the edge of the fold." The opening gradually decreases until the opposing folds of membrane are in contact, and then vanishes, leaving the fœtus surrounded by two membranes. The one next to the fœtus is the *amnion;* the other is gradually separated from the amnion, and joins the serous lamina of the blastoderma; this is the "false amnion" of Pander, or the "serous covering" of Von Baer. This mode of formation of the amnion has been observed by Von Baer in the dog, sheep, and pig; and his observation has been verified by Dr. Allen Thompson.

The membrane which surrounds the vitellus or yelk is very vascular; it becomes oval in shape, and more pointed where it is in contact with the embryo, until at length it contracts into a narrow duct, thus forming the *vesicula alba* and *duct.*

The *allantois*, as already mentioned, arises from the lower end of the intestinal canal on a little vesicle, and increasing in size, encircles the embryo along with the umbilical vesicle.

188. The heart of the embryo, which is the product of the vascular layer of the blastoderma, is formed at an early period; at first it appears as a twisted canal; at the under side it receives two omphalo-mesenteric veins, and in the situation of the future *bulbus aortæ* it divides into four vascular arches, which first uniting into the aorta, again divide, run down near the vertebral column, and give off the omphalo-mesenteric arteries, which ramify on the blastoderma and umbilical vesicle.

189. Thus, then, we have seen the embryo developed in the layers of the blastoderma, and formed by a gradual closing in of the laminæ towards the

median line; the brain and spinal marrow, which are its earliest rudiments, are covered in, and in like manner the parts anterior to the spine, as the thorax, abdomen, etc., are formed. We are indebted to comparative anatomy for opportunities of observation; but there is no doubt that the same process takes place in the human ovum. Professor Wagner has given a description of a human ovum of about three weeks old, part of which I shall take the liberty of quoting: "Such ova, still surrounded by decidua, measure about seven lines in length; in the naked chorion, they are about five lines long. The chorion at this time is beset externally with small cylindrical hollow villi. The embryo itself is two lines long. It is plainly surrounded by an amnion, which lies loosely, but still pretty closely about it, and obviously proceeds from the abdominal laminæ. The embryo is curved, and presents anterior cerebral vesicles or hemispheres, pretty well developed (figured rather large in figs. 63, 64), and considerable corpora quadrigemina immediately behind them; there is the distinct appearance of an eye, and a rounded offset from the medulla oblongata indicates the acoustic vesicle; several branchial arteries and fissures are also conspicuous, the last of them, however, not completely formed. The oral aperture is just above the upper branchial fissure. The anterior and posterior extremities are curved leaf-like processes, still of very small dimensions." The abdomen is yet an open cleft, in which, but projecting beyond it, is the heart, "of very large relative dimensions, and consisting of a simple atrium, or auricle, and ventricle; behind the heart is the liver, and under the liver the intestine, which is attached by means of a distinct mesentery." Where the large and small intestines meet, the canal makes a sweep in the umbilical vesicle. On either side of the mesenteric lamina, we find the primordial kidney, composed of short cæca. The allantois is seen extending from the lower part of the intestine.

[Fig. 62.]

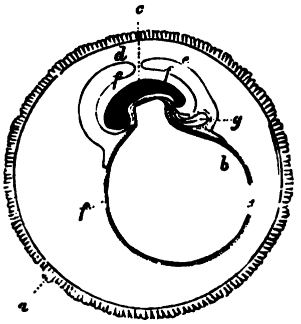
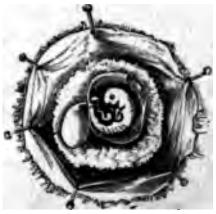


Diagram of an early *Human Ovum*, showing the *Amnion* in process of formation, and the *Allantois* beginning to appear:—*a*, chorion; *b*, vitelline mass surrounded by the blastodermic vesicle; *c*, embryo; *d*, *e*, and *f*, external and internal folds of the serous layer, forming the amnion; *g*, incipient allantois.

Fig. 63.

Fig. 64.



Human Ovum of about three weeks.

190. During the second month, we find the extremities larger and more projecting; the body curved, the head disproportionately large, and bent downwards, indications of the nostrils, and a gaping oral aperture. The abdomen is closed about the fifth week, except at the umbilical aperture, through which a loop of intestine still escapes. The os coccygis resembles a tail, bent forward, and of considerable size.

Fig. 65.

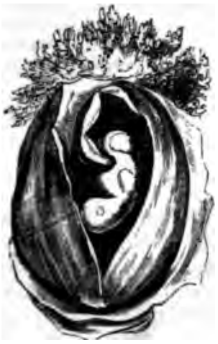
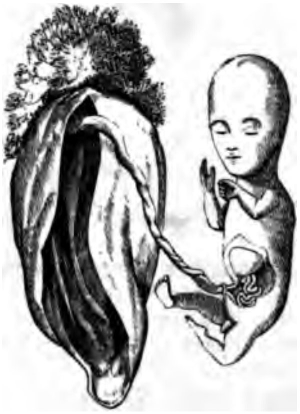


Fig. 66.



Human Ovum of about two months.

The forehead is more vaulted, because of the development of the hemispheres of the brain; the spinal cord is cylindrical, of nearly uniform thickness, and terminating in a blunt extremity; posteriorly it is open. "The medulla oblongata makes a bend forwards at the top of the neck, and then ascends perpendicularly into the capacious cranium, where the corpora quadrigemina present themselves, as two large semi-globular masses, having behind them a pair of narrow lateral laminæ, the rudiments of the cerebellum. The medullary stem, or crus cerebri, passes under the corpora quadrigemina, and again bending downwards, the corpora striata and optic thalami are evolved upon it."

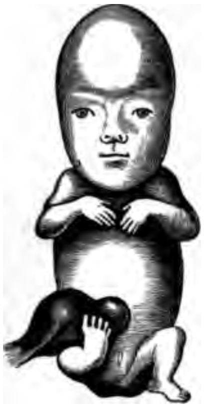
The first points of ossification appear about the seventh week, in the clavicle and lower jaw; the vertebral arches are not yet closed in, and the ribs appear like little streaks. The only trace of muscular fibre is in the diaphragm. The heart at this time begins to change its form, and the interventricular septum to form. The liver is very large and granular. The stomach is assuming somewhat of its normal form; the urinary bladder is enclosed, but the anus is imperforate.

After this period, the different parts are developed with tolerable rapidity; the separate portions of the brain are evolved, and the organs of sense acquire their external characters; the eyelids, nose, and ears are formed. About the seventh month, the membrana pupillaris is ruptured, and the pupil becomes visible. The cranium continues cartilaginous for some time, then points of ossification are seen, which radiate until each bone is nearly complete.

The upper and lower extremities increase, the hands and feet are developed; the fingers and toes separate, and the nails become distinct about the sixth or seventh month.

In front of the coccyx we find the anus, which at first is imperforate; and anterior to it, the organs of generation, in form at first of a conicle tubercle, which is subsequently developed into the penis or clitoris, while the skin at the sides is prolonged into the scrotum or labia. The testes are originally placed on each side of the vertebral column, but afterwards descend along the iliac vessels to the inguinal ring, through which they pass, carrying with them a portion of the peritoneum to form their tunica vaginalis.

Fig. 67.



Human Ovum of about three months.

The liver and kidneys are completed before the termination of pregnancy, and soon commence the performance of their functions; for the meconium is found to be colored by the bile even in premature children, and urine is frequently voided during delivery.

[The formation of the ovum, and the development of the embryo, are among the most incomprehensible subjects to a student; at the risk, therefore, of some repetition of what is said upon these points by the author, I here introduce the following quotation, with the accompanying illustrations, from Dr. Rigby's work on Midwifery, in which the subjects are very clearly and concisely treated:

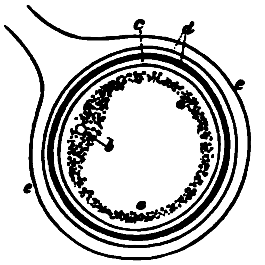
"*Embryo.*— There is, perhaps, no department of physiology which has been so remarkably enriched by recent discoveries, as that which relates to the primitive development of the ovum and its embryo. The researches of Baer, Rathke, Purkinje, Valentin, etc., in Germany; of Dutrochet, Prevost, Dumas, and Coste, etc., in France; and of Owen, Sharpey, Allen Thompson, Jones, and Martin Barry, in England, but more especially those of the celebrated Baer, have greatly advanced our knowledge of these subjects, and led us deeply into those mysterious processes of nature which relate to our first origin and formation.

"These researches have all tended to establish one great law, connected with the early development of the human embryo, and that of other mammiferous animals, viz., that it at first possesses a structure and arrangement analogous to that of animals in a much lower scale of formation; this observation also applies of course to the ovum itself, since a variety of changes take place in it after impregnation, before a trace of the embryo can be detected.

"At the earliest periods, the human ovum bears a perfect analogy to the eggs of fishes, amphibia, and birds: and it is only by carefully examining the changes produced by impregnation in the ova of these lower classes of animals, that we have been enabled to discover them in the mammalia and human subject.

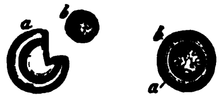
"As the bird's egg, from its size, best affords us the means of investigating these changes, and as in all essential respects they are the same in the human ovum, it will be necessary for us to lay before our readers a short account of its structure and contents, and also of the changes which they undergo, after impregnation. In doing this we shall merely confine ourselves to the description of what is applicable to the human ovum.

Fig. 68.



Section of a Hen's Egg within the Ovary.—a. The granulary membrane forming the periphery of the yelk. b. Vesicle of Purkinje embedded in the cumulus. c. Vitellary membrane. d. Inner and outer layers of the capsule of ovum. e. Indusium of the ovary.

Fig. 69.



a. Vitelline membrane. b. Blastoderma.—T. W. Jones.

"The egg is known to consist of two distinct parts, the vitellus or yelk surrounded by its albumen or white; to the former of these we now more particularly refer. The yelk is a granular albuminous fluid, contained in a granular membranous sac (the *blastodermic membrane*), which is covered by an investing membrane called the *vitelline membrane* or *yelk-bag*. The impregnated vitellus is retained in its capsule in the ovary precisely as the ovum of the mammifera is in the Graafian vesicle. The whole ovary in this case has a clustered appearance, like a bunch of grapes, each capsule being suspended by a short pedicle of indusium.

"In those ova which are considerably developed before impregnation, the granular blastodermic membrane is observed to be thicker, and the granules more aggregated at that part which corresponds to the pedicle, forming a slight elevation with a depression in its centre, like the cumulus in the proligerous disc of a Graafian vesicle. This little disc is the blastoderma, germinal membrane, or cicatricula; in the central depression just mentioned is an exceedingly minute vesicle, first noticed by Professor Purkinje of Breslau, and named after him: in more correct language it is the *germinal vesicle.*

"According to Wagner, the germinal vesicle is not surrounded by a disc before impregnation; and it is only after this process that the above-mentioned disc of granules is formed. By the time the ovum is about to quit the ovary the vesicle itself has disappeared, so that an ovum has never been found in the oviduct containing a germinal vesicle, nothing remaining of it beyond the little depression in the cumulus of the cicatricula.

"The rupture of the Purkinjean or germinal vesicle has been supposed by Mr. T. W. Jones to take place before impregnation; but the observations of Professor Valentin seem to lead to the inference that it is a result of that process, and must be therefore looked upon as one of the earliest changes which take place in the ovum or yelk-bag upon quitting the ovary.[1]

"During its passing through the oviduct (what in mammalia is called the fallopian tube), the ovum receives a thick covering of albumen, and as it descends still farther along the canal the membrane of the shell is formed.

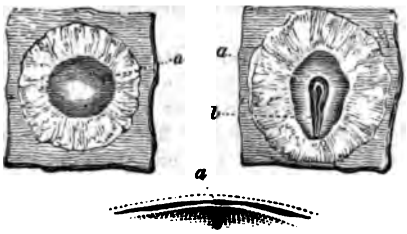
"On examining the appearance of the ovum in mammiferous animals, and especially the human ovum, it will be found that it presents a form and structure very analogous to the ova just described, more especially those of birds. It is a minute spherical sac, filled with an albuminous fluid, lined with its blastodermic or germinal membrane, in which is seated the germinal vesicle or vesicle of Purkinje. When the ovum has quitted the ovary the germinal vesicle disappears, and on its entering the fallopian tube it becomes covered with a gelatinous, or rather albuminous covering. This was inferred by Valentin, who considered that 'the enormous swelling of the ova, and their passage through the fallopian tubes,' tended to prove the circumstance.[2] It has since been demonstrated by Mr. T. W. Jones in a rabbit seven days after impregnation. The vitellary membrane seems, at this time, to give way, leaving the vitellus of the ovum merely covered by its spherical blastoderma, and encased by the layer of albuminous matter which surrounds it.

"From what we have now stated, a close analogy will appear between the ova of the mammalia and those of the lower classes, more especially birds, which from their size affords us the best opportunities of investigating this difficult subject.

"In birds, the covering of the vitellus is called *yelk-bag;* whereas, in mammalia and man it receives the name of *vesicula umbilicalis.* Its albuminous covering, which corresponds to the white and membrane of the shell in birds, is called *chorion:* by the time that the ovum has reached the uterus, this outer membrane has undergone a considerable change; it becomes covered with a complete down of little absorbing fibrillæ, which rapidly increase in size as development advances, until it presents that tufted vascular appearance, which we have already mentioned when describing this membrane.

"The first or primitive trace of the embryo is in the cicatricula or germinal membrane, which contained the germinal vesicle before its disappearance. In the centre of this, upon its upper surface, may be discovered a small dark line:[3] 'this line or primitive trace is swollen at one extremity, and is placed in the direction of the transverse axis of the egg.'

Fig. 70.



Changes in the Hen's Egg during Incubation.—*a.* Transparent area. *b.* Primitive trace.

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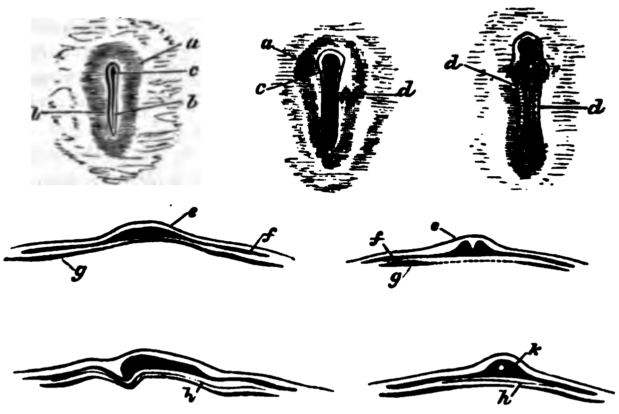
[1] [We said, "*one* of the earliest changes." Mr. Jones considers that "the breaking up of the surface of the yelk into crystalline forms," is the first change which he has observed.]

[2] [Edin. Med. and Surg. Journ., April, 1836.]

[3] [Allen Thompson on the Development of the Vascular System in the Fœtus of Vertebrated Animals. (Edin. New Philosoph. Journ., Oct. 1830.)]

"As development advances, the cicatricula expands. 'We are indebted to Pander,'[1] says Dr. Allen Thompson in his admirable essay above quoted, 'for the important discovery, that towards the twelfth or fourteenth hour, in the hen's egg the germinal membrane becomes divided into two layers of granules, the serous and mucous layers of the cicatricula; and that the rudimentary trace of the embryo, which has at this time become evident, is placed in the subtance of the uppermost or serous layer.' 'According to this observer, and according to Baer, the part of this layer which surrounds the primitive trace soon becomes thicker; and on examining this part with care, towards the eighteenth hour, we observe that a furrow has been formed in it, in the bottom of which the primitive trace is situated; about the twentieth hour this furrow is converted into a canal open at both ends, by the junction of its margins (the *plicæ primitivæ* of Pander, the *laminæ dorsales* of Baer): the canal soon becomes closed at the cephalic or swollen extremity of the primitive trace, at which part it is of a pyriform shape, being wider here than at any other part. According to Baer and Serres, some time after the canal begins to close, a semi-fluid matter is deposited in it, which on its acquiring greater consistence, becomes the rudiment of the spinal cord; the pyriform extremity or head is soon after this seen to be partially subdivided into three vesicles, which being also filled with a semi-fluid matter, gives rise to the rudimentary state of the encephalon.' 'As the formation of the spinal canal proceeds, the parts of the serous layer which surrounds it, especially towards the head, become thicker and more solid, and before the twenty-fourth hour we observe on each side of this canal four or five small round opaque bodies; these bodies indicate the first formation of the dorsal vertebræ.

Fig. 71.



Changes in the Hen's Egg during Incubation.—*a.* Transparent area. *b.* Laminæ dorsales. *c.* Cephalic end. *d.* Rudiments of dorsal vertebræ. *e.* Serous layer. *f.* Lateral portion of the primitive trace. *g.* Mucous layer. *h.* Vascular layer. *k.* Laminæ dorsales united to form the spinal canal.

"'About the same time, or from the twentieth to the twenty-fourth hour, the inner layer of the germinal membrane undergoes a farther division, and by a peculiar change is converted into the vascular mucous layers.'[2] It will thus be seen, that the germinal membrane is that part of the ovum in which the first changes produced by impregnation are observed. The rudiments of the osseous and nervous systems are formed by the outer or serous layers; the outer covering of the fœtus or integuments, including the amnios, are also furnished by it. 'The layer next in order has been called *vascular*, because in it the development of the principal parts of the vascular system appears to take place. The third, called the *mucous* layer, situated next the substance of the yelk, is generally in intimate connection with the vascular layer, and it is to the changes which these combined layers undergo, that the intestinal, the respiratory, and probably also the glandular systems, owe their origin.'[1]

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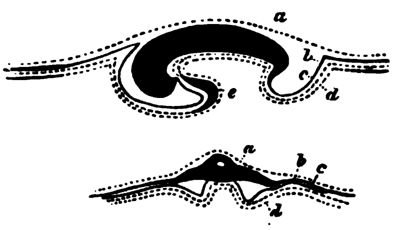
[1] [Pander, Beiträge zur Entwickelungs-geschichte des Hünchens im Eie. Würzburg, 1817.]

[2] [A. Thompson, op. cit.]

Fig. 72.



Changes in the Hen's Egg during Incubation.—*a.* Serous layer. *b, c.* Vascular layer. *d.* Mucous layer. *e.* Heart.

"The embryo is therefore formed in the layers of the germinal membrane, and becomes, as it were, spread out upon the surface of the ovum; the changes which the ovum of mammalia undergoes appear, from actual observation, to be precisely analogous to those in the inferior animals. (*Baer, Prevost,* and *Dumas.*) From the primitive trace, which was at first merely a line crossing the cicatricula, and which now begins rapidly to exhibit the characters of the spinal column, the parietes of the head and trunk gradually approach farther and farther towards the anterior surface of the abdomen and head until they unite; in this way the sides of the jaws close in the median line of the face, occasionally leaving the union incomplete, and thus appearing to produce in some cases the congenital defects of hair-lip and cleft palate. In some way the ribs meet at the sternum; and it may be supposed that sometimes this bone is left deficient, and thus may become one of the causes of those rare cases of malformation, where the child has been born with the heart external to the parietes of the thorax. In like manner the parietes of the abdomen and pelvis close in the linea alba and symphysis pubis, occasionally leaving the integuments of the navel deficient, or, in other words, producing congenital umbilical hernia, or at the pubes a non-union of its symphysis with a species of inversion of the bladder, the anterior wall of that viscus being nearly or entirely wanting.

"The cavity of the abdomen is therefore at first open to the vesicula umbilicalis or yelk, but this changes as the abdominal parietes begin to close in; in man and the mammalia merely a part of it, as above mentioned, forms the intestinal canal, whereas, in oviparous animals, the whole of the yelk-bag enters the abdominal cavity, and serves for an early nutriment to the young animal. Another change connected with the serous or outer layer of the germinal membrane is the formation of the *amnion*. The fœtal rudiment, which from its shape has been called *carina*, now begins to be enveloped by a membrane of exceeding tenuity, forming a double covering upon it; the one which immediately invests the fœtus is considered to form the future epidermis; the other, or outer fold, forms a loose sac around it, containing the liquor amnii. Whilst these changes are taking place in the serous layer of the germinal membrane, and whilst the intestinal canal, etc., are forming on the anterior surface of the embryo, which is turned towards the ovum, by means of the inner or mucous layer, equally important changes are now observed in the middle or vascular layer. 'In forming this fold,' says Dr. A. Thompson, 'the mucous layer is reflected farthest inwards; the serous layer advances least, and the space between them, occupied by the vascular layer, is filled up by a dilated part of this layer, the rudiment of the heart.'[1]

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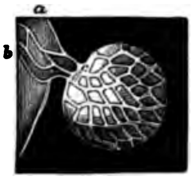
[1] [A. Thompson, op. cit., 298.]

Fig. 73.



Vesicula Umbilicalis, from Baer.—*b*. Is a portion of the convexity of the amnion, upon which at *a*, is the fundus of the diminutive human allantois.

c. The duct of the vesicula umbilicalis, dividing into two intestinal portions; and besides this duct are two vessels which are distributed upon the vesicula umbilicalis, and form a reticular anastomosis with each other.

"Whilst this rudimentary trace of the vascular system is making its appearance, minute vessels are seen ramifying over the vesicula umbilicalis, forming, according to Baer's observations, a reticular anastomosis, which unites into two vessels the vasa omphalo-meseraica.[2] These may be demonstrated with great ease in the chick: the cicatricula increases in extent; it becomes vascular, and at length forms a heart-shaped network of delicate vessels, which unite into two trunks, terminating one on each side of the abdomen.

"The umbilical vesicle now begins to separate itself more and more from the abdomen of the fœtus, merely a duct of communication passing to that portion of it which forms the intestinal canal. The first rudiment of the cord will be found at this separation; its fœtal extremity remains for a long time funnel-shaped, containing, besides a portion of intestine, the duct of the vesicula umbilicalis, the vasa omphalo-meseraica (the future vena portæ), the umbilical vein from the collected venous radicles of the chorion, and the early trace of the umbilical arteries. These last-named vessels ramify on a delicate membranous sac of an elongated form, which rises from the inferior or caudal extremity of the embryo, viz., the *allantois;* whether this is formed by a portion of the mucous layer of the germinal vesicle, in common with the other abdominal viscera, appears to be still uncertain; in birds this may be very easily demonstrated as a vascular vesicle arising from the extremity of the intestinal canal; and in mammalia, connected with the bladder by means of a canal called *urachus;* from its sausage-like shape, it has received the name of *allantois.*

"The existence of an allantois in the human embryo has been long inferred from the presence of a ligamentous cord extending from the fundus of the bladder to the umbilicus, like the urachus in animals. But from the extreme delicacy of the allantois, and from its function ceasing at a very early period, it had defied all research, until lately, when it has been satisfactorily demonstrated in the human embryo by Baer and Rathke. It occupies the space between the chorion and amnion, and gives rise occasionally to a collection of fluid between these membranes, familiarly known by the name of the liqnor amnii spurius, which, strictly speaking, is the liquor allantoidis.

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[1] [Op. cit., p. 301.

[2] British and Foreign Med. Rev. No. 1.]

"The function of the allantois is still in a great measure unknown. In animals it evidently acts as a species of receptaculum urinæ during the latter periods of gestation; but it is very doubtful if this be its use during the earlier periods. It does not seem directly connected with the process of nutrition, which at this time is proceeding so rapidly, first by means of the albuminous contents of the vitellus, or vesicula umbilicalis, and afterwards by the absorbing radicles of the chorion; but, from analogy with the structure of the lower classes of animals, it would appear that it is intended to produce certain changes in the rudimentary circulation of the embryo, similar to those which, at a later period of pregnancy, are effected by means of the placenta, and after birth, by the lungs, constituting the great functions of respiration.

"In many of the lower classes of animals, respiration (or at least the functions analogous to it) is performed by organs situated at the inferior or caudal extremity of the animal: thus, for instance, certain insect tribes, as in hymenoptera, or insects with a sting, as wasps, bees, etc.; in diptera, or insects with two wings, as the common fly; and also the spider-tribe, have their respiratory organs situated in the lower part of the abdomen. In some of the crustacea, as, for instance, the shrimp, the organs of respiration lie under the tail, between the fins, and floating loosely in the water. Again, some of the mollusca, viz., the cuttle-fish, have the respiratory organs in the abdomen. We also know that many animals, during the first periods of their lives, respire by a different set of organs to what they do in the adult state; the most familiar illustration of this is the frog, which, during its tadpole state, lives entirely in the water.

"As the growth of the embryo advances, other organs, whose function is as temporary as that of the allantois, make their appearance: these also correspond to the respiratory organs of a lower class of animals, although higher than those to which we have just alluded, — we mean branchial processes or gills. It is to Professor Rathke[1] that we are indebted for pointing out the interesting fact, that several transverse slit-like apertures may be detected on each side of the neck of the embryo, at a very early stage of development. In the chick, in which he first observed it, it takes place about the fourth day of incubation: at this period the neck is remarkably thick, and contains a cavity which communicates inferiorly with the œsophagus and stomach, and opens externally on each side by means of the above-mentioned apertures, precisely as is observed in fishes, more especially the shark tribe; these apertures are separated from each other by lobular septa, of exceedingly soft and delicate structure. Rathke observed the same structure in the embryo of the pig and other mammalia; and Baer has since shown it distinctly in the human embryo. It is curious to see how the vascular system corresponds to the grade of development then present: the heart is single, consisting of one auricle and one ventricle; the aorta gives off four delicate, but perfectly simple branches, two of which go to the right, and two to the left side; each of these little arteries passes to one of the lobules or septa at the side of the neck, which correspond to gills, and having again united with three others, close to what is the first rudiment of the vertebral column, they form a single trunk, which afterwards becomes the abdominal aorta. In a short time these slit-like openings begin to close; the branchial processes or septa become obliterated, and indistinguishable from the adjacent parts; the heart loses the form of a single heart; a crescentic fold begins to mark the future division into two ventricles, and gradually extends until the septum between them is completed. It is also continued along the bulb of the aorta, dividing it into two trunks, the aorta proper and pulmonary artery; at the upper part the division is left incomplete, so that there is an opening from one vessel to the other, which forms the ductus arteriosus.[1] A similar process takes place in the auricles, the foramen ovale being apparently formed in the same manner as the ductus arteriosus; these changes commence in the human embryo about the fourth week, and are completed about the seventh.

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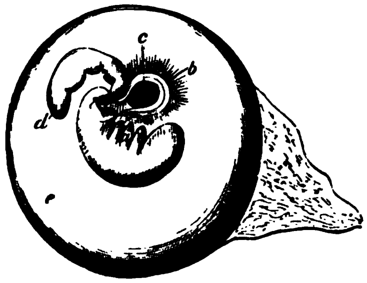
[1] [Acta Naturæ Curios., vol. xiv.]

Fig. 74.



Vesicula Umbilicalis, from Baer.—*a.* **Branchial processes.** *b.* **Vesicula umbilicalis.** *c.* **Vitellus.** *d.* **Allantois.** *e.* **Amnion.**

"At first the body of the embryo has a more elongated form than afterwards, and the part which is first developed is the trunk, at the upper extremity of which a small prominence, less thick than the middle part, and separated from the rest of the body by an indentation, distinguishes the head. There are as yet no traces whatever of extremities, or of any other prominent parts; it is straight, or nearly so, the posterior surface slightly convex, the anterior slightly concave, and rests with its inferior extremity directly upon the membranes, or by means of an extremely short umbilical cord.

"The head now increases considerably in proportion to the rest of the body; so much so, that at the beginning of the second month, it equals nearly half the size of the whole body: previous to, and after this period, it is usually smaller. The body of the embryo becomes considerably curved, both at its upper as well as its lower extremity, although the trunk itself still continues straight. The head joins the body at a right angle, so that the part of it which corresponds to the chin is fixed directly upon the upper part of the breast; nor can any traces of neck be discerned, until nearly the end of the second month.

"The inferior extremity of the vertical column, which at first resembles the rudiment of a tail, becomes shorter towards the middle of the third month, and takes a curvature forwards under the rectum. In the fifth week the extremities become visible, the upper usually somewhat sooner than the lower, in the form of small blunt prominences,—the upper close under the head, the lower near the caudal extremity of the vertebral column. Both are turned somewhat outwards, on account of the size of the abdomen; the upper are usually directed somewhat downwards, the lower ones somewhat upwards.

"The vesicula umbilicalis may still be distinguished in the second month as a small vesicle, not larger than a pea, near the insertion of the cord, at the navel, and external to the amnion. From the trunk, which is almost entirely occupied by the abdominal cavity, arises a short, thick umbilical cord, in which some of the convolutions of the intestines may still be traced.

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[1] [In making these observations upon the formation of the ductus arteriosus, we must request our readers to consider this as still an unsettled question.]

Besides these, it usually contains, as already observed, the two umbilical arteries and the umbilical vein, the urachus, the vasa omphalo-meseraica, or vein and artery of the vesicula umbilicalis, and perhaps, even at this period, the duct of communication between the intestinal canal and vesicula umbilicalis, the fœtal extremity of which, according to Professor Oken's views, forms the processus vermiformis.

Fig. 75.

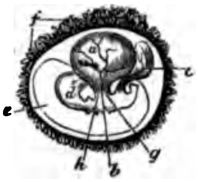

Diagram of the fœtus and membranes about the fourth week. From Carus. — *a*. Vesicula umbilicalis, already passing into the ventricular and rectum intestine at *g*. *b*. Vena and arteria omphalo-meseraica. *c*. Allantois springing from the pelvis with the umbilical arteries. *d*. Embryo. *e*. Amnion. *f*. Chorion.

"The hands seemed to be fixed to the shoulders without arms and the feet to adhere to the ossa ilii; the liver seems to fill the whole abdomen; the ossa innominata, the ribs, and scapulæ, are cartilaginous.

Fig. 76.

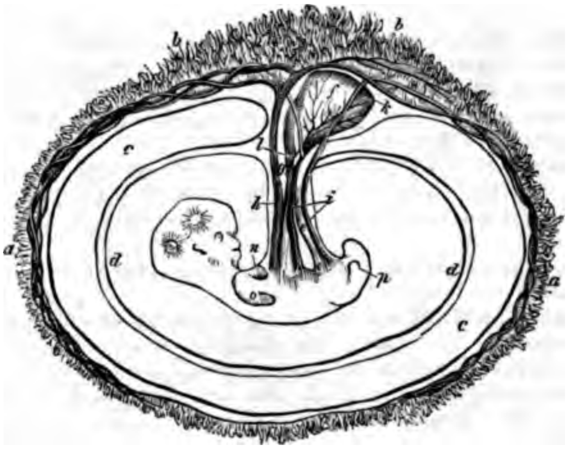

Diagram of the Fœtus and Membranes about the sixth week. From Carus.—*a*. Chorion. *b*. The larger absorbent extremities, the site of the placenta. *c*. Allantois. *d*. Amnion. *e*. Urachus. *é*. Bladder *f*. Vesicula umbilicalis. *g*. Communicating canal between the vesicula umbilicalis and intestine. *h*. Vena umbilicalis. *i*, *i*. Arteriæ umbilicalis. *l*. Vena omphalo-meseraica. *k*. Arteria omphalo-meseraica. *n*. Heart. *o*. Rudiment of superior extremity. *p*. Rudiment of lower extremity.

"In a short time the little stump-like prominences of the extremities become longer, and are now divided into two parts, the superior into the hand and the fore-arm, the inferior into the foot and leg; in one or two weeks later, the arms and thighs are visible. These parts of the extremities which are formed later than the others, are at first smaller, but as they are gradually developed they become larger. When the limbs begin to separate into an upper and lower part, their extremities become rounder and broader, and divided into the fingers and toes, which at first are disproportionately thick, and until the end of the third month are connected by a membranous substance analogous to the webbed feet of water-birds; this membrane gradually disappears, beginning at the extremities of the fingers and toes, and continuing the division up to their insertion. The external parts of generation, the nose, ears, and mouth, appear after the development of the extremities. The insertion of the umbilical cord changes its situation to a certain degree; instead of being nearly at the extremity of the fœtus, as at first, it is now situated higher up, on the anterior surface of the abdomen. The comparative distance between the umbilicus and pubis continues to increase, not only to the full period of gestation, when it occupies the middle point of the length of the child's body, as pointed out by Chaussier, but even to the age of puberty, from the relative size of the liver becoming smaller.

"Though the head appears large at first, and for a long time continues so, yet its contents are tardy in their development, and until the sixth month the parietes of the skull are in great measure membranous or cartilaginous. Ossification commences in the base of the cranium, and the bones under the scalp are those in which this process is last completed.

"The contents of the skull are at first gelatinous, and no distinct traces of the natural structure of the brain can be identified until the close of the second month; even then it requires to have been some time previously immersed in alcohol to harden its texture. There are many parts of it not properly developed until the seventh month. In the medulla spinalis no fibres can be distinguished until the fourth month. The thalami nervorem opticorum, the corpora striata, and tubercula quadrigemina, are seen in the second month; in the third, the lateral and longitudinal sinuses can be traced, and contain blood. In the fifth we can distinguish the corpus callosum; but the cerebral mass has yet acquired very little solidity, for until the sixth month it is almost semi-fluid.[1]

"About the end of the third, during the fourth, and the beginning of the fifth months, the mother begins to be sensible of the movements of the fœtus. These motions are felt sooner or later, according to the bulk of the child, the size and shape of the pelvis, and the quantity of fluid contained in the amnion; the waters being in larger proportionate quantity the younger the fœtus.

"The secretion of bile, like that of the fat, seems to begin towards the middle of pregnancy, and tinges the meconium, a mucous secretion of the intestinal tube, which had hitherto been colorless, of a yellow color. Shortly after this the hair begins to grow, and the nails are formed about the sixth or seventh month. A very delicate membrane (membrana pupillaris), by which the pupil has been hitherto closed, now ruptures, and the pupil becomes visible. The kidneys, which at first were composed of numerous glandular lobules (seventeen or eighteen in number), now unite, and form a separate viscus on each side of the spine; sometimes they unite into one large mass, an intermediate portion extending across the spine, forming the horse-shoe kidney.

"Lastly, the testes, which at first were placed on each side of the lumbar vertebræ, near the origin of the spermatic vessels, now descend along the iliac vessels towards the inguinal rings, directed by a cellular cord, which Hunter has called *Gubernaculum testis:* they then pass through the openings, carrying before them that portion of the peritoneum which is to form their tunica vaginalis.

"The length of a full-grown fœtus is generally about eighteen or nineteen inches; its weight between six and seven pounds. The different parts are well developed and rounded; the body is generally covered with the vernix caseosa; the nails are horny, and project beyond the tips of the fingers, which is not the case with the toes; the head has attained its proper size and hardness; the ears have the firmness of cartilage; the scrotum is rugous, not peculiarly red, and usually containing the testes. In female children, the nymphæ are generally covered entirely by the labia, the breasts project, and in both sexes frequently contain a milky fluid. As soon as a child is born, which has been carried the full time, it usually cries loudly, opens its eyes, and moves its arms and legs briskly; it soon passes urine and fæces, and greedily takes the nipple.[1]

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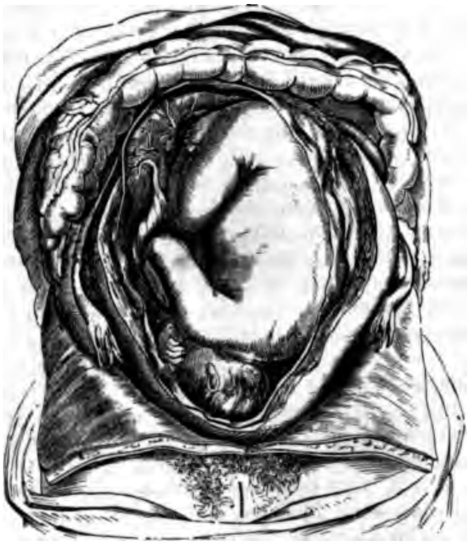
[1] [Campbell's System of Midwifery.]

"Thus then, in the space of forty weeks, or ten lunar months, from an inappreciable point, the fœtus attains a medium length of about eighteen or nineteen inches, and a medium weight of between six and seven pounds."]

191. It was formerly asserted that the *position of the child* in utero during the early months was sedentary, facing anteriorly; and that towards the end of gestation, owing to the greater weight of the head, and to its voluntary efforts, it made a revolution, so as to present with the head. This, however, is not the case. With some exceptions, the position of the child is unaltered from an early period of pregnancy to its termination, whether the head be upwards or downwards. The arms are generally folded over the chest, the knees drawn up to the abdomen, the back curved, and the head bent upon the chest so as to occupy as little space as possible. In ordinary cases, the face and anterior surface of the child neither look forward, as was formerly supposed, nor in the direction of the transverse diameter of the pelvis, as is sometimes stated, but obliquely; so that in the first and second *position* the *back* of the fœtus is turned partly forwards; and the *chest* in the third and fourth. This point having been established by observation, we are enabled in many cases to ascertain the position of the infant before labor has commenced, by means of the stethoscope, according

Fig. 77.



Position of Fœtus in Utero.

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[1] [Naegelè's Hebammenbuch.]

as the pulsation is heard at one side or other of the abdomen, and more or less clearly.

192. Various *causes* of the position of the fœtus in utero have been mentioned, such as gravitation, voluntary movements, etc.

Although the supposition that the greater weight of the head is the cause has the high authority of Dr. Hunter,[1] I do not think it can be maintained, any more than Ambrose Paré's notion, that it was owing to its efforts to escape[2] from the uterus; or M. Dubois' view, that it is the result of an instinctive and voluntary determination on the part of the fœtus.[3]

Drs. M'Clintock and Hardy[4] have furnished data, in addition to those we already possess, for the subversion of the first of these opinions, and the latter appears to me to require proof rather than an answer. M. Cazeaux regards the shape and mode of enlargement of the uterus as the chief, if not the only cause of the position of the fœtus—that it is not an "instinctive but a mechanical" arrangement.[5]

But the entire question has been investigated by my friend Dr. Simpson, with elaborate care and great acuteness, and I confess that his conclusions appear to me more comprehensive and more correct than any preceding authority. They are as follows:—"1. The usual position of the fœtus, with the head lowest and presenting over the os uteri, is not assumed till about the sixth month of intra-uterine life, and becomes more frequent and more certain from that time onwards to the full term of utero-gestation. 2. Both the assumption and maintenance of this position are vital and not physical acts, for they are found dependent on the existence and continuance of vitality in the child; concurring with its life, but being lost by its death. 3. In human physiology we do not know or recognize any vital power or action, except muscular action, capable of producing motions calculated to alter or regulate the position, either of the whole body or of any of its parts; and further, the motory muscular actions of the fœtus are not spontaneous or voluntary, but reflex or excito-motory in their nature, causation, and effects. 4. The position of the fœtus, with the head placed over the os uteri, is that position in which the physical shape of the normal and fully-developed fœtus is best adapted to the physical shape of the normal and fully-developed cavity of the uterus. 5. This adaptive position of the contained body to the containing cavity is the aggregate result of reflex or excito-motory movements on the part of the fœtus, by which it keeps its cutaneous surface withdrawn as far as possible from the causes of irritation that may act upon it as excitants, or that happen to restrain its freedom of position or of motion."[6] And the mal-positions and mal-presentations he attributes to:—"1. Prematurity of the labor, parturition occurring before the natural position of the fœtus is established. 2. Death of the child in utero, or, in other words, the loss of the adaptive vital reflex actions of the fœtus. 3. Causes altering the normal shape of the fœtus or contained body, or causes altering the normal shape of the uterus or containing body, and thus forcing the fœtus to assume, in its reflex movements, an unusual position, in order to adapt itself to the unusual circumstances in which it happens to be placed. 4. Preternatural presentations are occasionally the result of causes physically displacing either the whole fœtus or its presenting part, during the latter periods of utero-gestation or at the commencement of labor."

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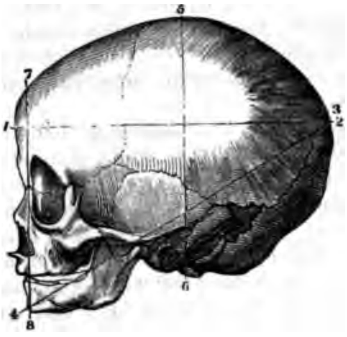
[1] Description of the Gravid Uterus, p. 66.
[2] Works, Trans., p. 889.
[3] Mém. de l'Academie de Médecine, vol. ii. p. 280.
[4] On Midwifery and the Puerperal State, p. 4.
[5] Traité du Accouchemens, p. 148, Brussels Ed.
[6] Ed. Monthly Journal of Med. Science, vol. ix. p. 867.

193. The length of a full-grown fœtus is from 18 to 22 or 24 inches: The longitudinal diameter of its head $({}^{1}\,{}^{2})$ is from 4 in. to 4½ in.

The transverse	3½	to 4
The occipito-mental or oblique $({}^{3}\,{}^{4})$ . .		5
The cervico-bregmatic $({}^{5}\,{}^{6})$	4	to 4½
The trachelo-bregmatic	3½	to 4
The inter-auricular		3
The fronto-mental $({}^{7}\,{}^{8})$		3½
The transverse diameter of the shoulders .	4¾	to 5½
" " " " hips . .	4	to 5

Fig. 78.



Fœtal Head Diameters.

In general, it may be observed, that all the measurements are less in female than in male children.

[Dr. Meigs[1] makes the occipito-frontal diameter four inches and ten-twelfths of an inch in width. "I speak," he remarks, "with great confidence as to the above estimate, for I have correctly measured and recorded the size of three hundred crania of mature children that I received in the course of my obstetric practice."

The bi-parietal diameter, being the mean derived from the measurement of one hundred and fifty crania, he makes three inches and eleven-twelfths of an inch.

The occipito-mental diameter, being the mean derived from the measurement of one hundred and twenty-six crania, he makes five inches and a half.]

The weight of a full-grown child at birth varies in the same and in different sexes. Rœderer found the weight in Germany to be from seven to eight pounds. Dr. Joseph Clarke, in the Lying-in Hospital, Dublin, ascertained the weight of the majority to be about seven pounds, but that it varied from four to eleven pounds. In France, the average weight is less; according to Camus, it is six pounds and a quarter, and observations at La Maternité have confirmed this estimate. In Brussels it is six pounds and a half; but in Moscow, nine pounds and one-fifteenth. Dr. Beck states that the average weight in America exceeds seven pounds.

Dr. Elsbæsser, of Wurtemburg, has published some extensive researches on this subject: he found in 1000 children at birth, that 13 weighed from 4 to 5 pounds; 58 from 5 to 6; 17 from 6 to 7; 318 from 7 to 8; 83 from 8 to 9; and 11 from 9 to 10 pounds, giving an average of 4 pounds 14 ounces. (The Wurtemburg pound is rather more, and the inch rather less, than the English.)

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[1] [Obstetrics: the Science and the Art, p. 63.]

The maximum length of males in 1000 children was 19 in. 17 lines.
" " " females " " 19 " 1 "
The minimum length of males " " 14 " 15 "
" " " females " " 14 " 9 "[1]

Dr. Storer, of Boston, found that in 222 males the average weight was 7½ pounds, and in 184 females the average weight was 7⅑ pounds.[2]

[The variations in the weight of new-born infants are very considerable in all countries: but it is highly probable that the *average* in this respect, if it could be correctly ascertained, would not be found to vary much in different countries. In the United States, it is by no means customary in private practice either to measure or weigh the infant at the time of birth, except when the size is strikingly above or below the usual standard: hence all general statements as to the medium weight of new-born infants in this country are derived chiefly from births in alms-houses and hospitals, and can hardly be considered to represent fairly what obtains among the mass of the people.]

194. The umbilicus changes its relative position as the development of the fœtus proceeds, until at birth it is near the middle of the entire length of the child. According to Chaussier, Bigeschi, and others, this relative position of the umbilicus is a test of its maturity, being distant from the central point in proportion to its immaturity. But it seems doubtful whether its position is so exactly central in mature children as these authors state; for M. Moreau has recently measured 500 children, born at the full term in La Maternité, Paris, and of this number he found only four in whom the umbilicus was exactly central. In the remainder, the point of insertion of the funis fell on an average from eight to ten lines below the middle. In a few children born about the sixth or eighth month, the umbilicus was central.

Dr. Elsbæsser examined 200 children, and found that the length of the supra-umbilical portion was—

In the males	9 in. 2½ lines.
In the females	9 " " "

The infra-umbilical portion was —

In the males	7 in. 9 lines.
In the females	7 " 7 "

So that the difference in the length was —

In the males	1 in. 3·40 lines.
In the females	1 " 3·57 "

Dr. Storer found the average length of males was eighteen, and of females twenty inches.

195. The *characteristics of the maturity and perfection* of a child at birth, according to Foderè and Capuron, are, its ability to cry as soon as it reaches the atmospheric air, or shortly after; to move its limbs with facility and more or less strength, its body being of a clear red color; the mouth, nostrils, eyelids, and ears, perfectly open; the bones of the cranium possessing some solidity, and the edges of the fontanelles not far apart; the hair, eyebrows, and nails, perfectly developed; the free discharge of the meconium a few hours after birth, and finally, the power of swallowing and digesting, indicated by its seizing the nipple or finger placed within its mouth.

The child may be considered *immature* when its length and volume are much less than those of an infant at the full term; when it does not move its limbs, or makes any feeble motions; when it seems unable to suck, and has to be fed artificially; when the skin is of an intensely red color, and traversed by numerous bluish vessels; when the head is covered with down, and the nails are not formed; when the bones of the head are soft, and the fontanelles widely separated; the eyelids, mouth, and nostrils closed; when it sleeps continually, and an artificial heat is necessary to preserve it; and when it discharges its urine and meconium imperfectly.

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[1] Edin. Monthly Journal of Med. Science, vol. iv. p. 803.

[2] Report of the Boston Lying-in Hospital, Amer. Journal of Med., Oct., 1850.

There are cases on record of children prematurely born at the fifth and sixth month of gestation attaining maturity; but ordinarily we do not consider a child "*viable*" until about the seventh month of utero-gestation.

196. The *proportion of the sexes* in Europe, according to the learned M. Quetelet, is about 106 males to 100 females, nor does it appear that in this part of the world climate has much influence. At the Cape of Good Hope female births predominate among the free inhabitants, and male births among the slaves. A country life seems to favor the production of male progeny; and the relative ages of husband and wife exert a decided influence; for in proportion as the husband is younger than the wife, girls predominate, and within certain limits, a disproportion the other way has the opposite effects; or, as Mr. Sadler has expressed it, upon a mean number of births, the sex of the child is that of the parent whose age is in excess.

The season of the year seems to influence to some degree both the number of births and the greater proportion of female children. In Philadelphia the greatest number of conceptions occur in the spring months, and the greatest excess of male conceptions in the winter season.[1]

[Dr. G. Emerson, of Philadelphia, has carefully investigated the influences operating to change the number of births, and also the relative proportion of the sexes at birth; he includes them under two heads: —

1st. The Seasons. — The following general results relative to this point were obtained from estimates based upon 65,542 births in Philadelphia. The greatest number of conceptions occurred during the winter and spring months; the maximum being 17,645 in the spring months. The smallest number occurred in the autumn and summer months, the minimum being 15,200 in the summer quarter.

The greatest excess of male conceptions is shown to be in the winter season, when, the total being 17,184, the males were 9,007, and the females 8,177. The excess of male conceptions for the other three quarters or seasons, varies but little from the minimum excess, which occurs in spring.

2d. The plenty or deficiency of food, purity or impurity of the air, overworking, and whatever tends to exalt or to impair the vital energies of the people. In many parts of Europe, where the general population is overworked and *under-fed*, the excess of male births is very small; being throughout France and Prussia under 6 per cent., and in England about 5 per cent. In Philadelphia, where the general condition of the population is very favorable, the male births exceed the female about 7 per cent. In the rural districts of the United States, and especially in the newest settlements, the preponderance of boys at birth is believed to be not less than 10 per cent. An opposite result is found when fatal epidemics alarm and depress the public mind. Thus, among the children born in Philadelphia, whose conception occurred during the prevalence of the cholera in 1832, there was a preponderance of females. The same result was shown in the births which took place in Paris, nine months after the cholera prevailed there in 1832. The births, at a somewhat later period after the visitation of the epidemic, exhibit an increase in the amount of males, in consequence, it is presumed, of the parents being endowed with vital energies above the average, as is shown by their exemption or recovery from the disease.[1]]

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[1] Trans. of American Med. Association, vol. iii. p. 93.

The number of twin cases at La Maternité was 444 in 37,441 cases, or 1 in 84; in the Dublin Lying-in Hospital 2101 cases in 134,908, or about 1 in 64; in the same number 29 triplet cases occurred, or 1 in 4652; and one case of quadruplets.

The mean proportion of still-born children in the cities of Europe is about 1 in 22 births; the extreme variation is from 1 in 11 at Strasburg, to 1 in 36 at Stockholm.

In the Lying-in Hospital in this city, from its establishment in 1757 to 1836, there occurred 8021 still-born children in 134,908 cases, or about 1 in 17. [In New York, from 1854 to 1857, there were 48,323 births, and 5931 still-births, at the full time and prematurely; that is to say, 1 to every 8·1. In Philadelphia, the premature and still-births were, in 1858, as 1 to every 14·8 births.]

The number of still-born males is greater than that of females: in West Flanders and at Berlin in the proportion of 14 to 10. [The excess of still-born females is in Philadelphia even greater.]

197. The PHYSIOLOGY OF FŒTAL LIFE is simply that of organic nutrition; at first by superficial imbibition, afterwards probably by absorption by the villi of the chorion, and ultimately by the changes made in or additions to the fœtal blood in the placenta.

The sources of nutriment during the earliest periods of embryonic life are the vitellus, or the fluid in the umbilical vesicle, and possibly the gelatinous matter (tunica media) between the amnion and chorion. After the formation of the amnion, its fluid may possibly contribute to this end. Dr. Montgomery, as we have seen, suggests that the milky fluid contained in the decidual cotyledons may also be available for this purpose.

There is no doubt of the functions of the placenta: there the blood of the fœtus is renovated from that of the mother, in the same way as the blood of fishes is aërated by the water passing through the gills.

Whether, in the earlier months, absorption is carried on by the surface alone, or whether, as Velpeau suggests, a portion of the liquor amnii finds its way into the stomach, may be difficult to decide, but that a certain amount of digestion is carried on, is impossible to doubt.

[A distinguished physiologist observes on this subject that, "The most plausible opinion he can form on this intricate subject is, that the mother secretes the substances, which are placed in contact with the fœtus, in a condition best adapted for its nutrition; that in this state they are received into the system, by absorption, as the chyle or the lymph is received into the adult, undergoing modifications in their passage through the fœtal placenta, as well as in every part of the system where the elements of the blood must escape for the formation of the various tissues.

"With regard to the precise nutritive functions executed in the fœtal state, and *first*, as concerns *digestion*, it is obvious that this cannot take place to any extent, otherwise excrementitious matter would have been thrown out, which by entering the liquor amnii, would be fatal to its important functions, and probably to the very existence of the fœtus. Yet, that some digestion is effected, is manifest from the presence of meconium in the intestines, which is probably the excrementitious matter arising from the digestion of the mucous secretions of the alimentary canal."[2]

The sources from which the nutrition of the fœtus is derived during the first four months of intra-uterine life, are involved in no little obscurity. Subsequently to the fourth month, it would seem now to be very generally admitted that the fœtus derives its nourishment solely through the placenta. The abundant nutritious materials of the blood in the maternal sinuses of that organ, passing through the intervening membrane by endosmosis, and entering the blood of the fœtus. This, however, cannot be the case previously to the formation of the placenta. Nor can the fœtus be nourished then by the digestion of any substance introduced into its stomach, from the fact that no gastric juice is formed previously to birth. It is supposed, as we have just shown, by Dr. Dunglison, that the presence of meconium in the intestines, is a proof that digestion takes place during fœtal life, the meconium being in fact the excrementatory matter resulting from such cause. But this is disproved by an examination of the composition of the meconium, and from it being more than probable that this substance is itself an excretion from the internal mucous membrane.

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[1] [Transactions of the American Med. Association, vol. iii. p. 93.]

[2] [Dunglison's Human Physiology, 4th edition, vol. ii. p. 497.]

The meconium contains a large quantity of fat, as well as various insoluble substances, probably the residue of epithelial and mucous accumulations. It does not contain the slightest trace of biliary matter.

"It is a singular fact," remarks Dr. Dalton,[1] "that the amniotic fluid, during the latter half of fœtal life, finds its way, in greater or less abundance, into the stomach, and through that into the intestinal canal. Small cheesy-looking masses may sometimes be found at birth in the fluid contained in the stomach, which are seen on microscopic examination to be no other than portions of the vernix caseosa, exfoliated from the skin into the amniotic cavity, and afterwards swallowed into the stomach. According to Kolliker,[2] the soft downy hairs of the fœtus, exfoliated from the skin, are often swallowed in the same way, and may be found in the meconium."

The manner in which the fœtus during the earlier months of its existence is nourished, must be considered as still an open question. The doctrine that it is by the absorption and appropriation of the nutritive matter contained in the liquor amnii, or of a plastic fluid secreted by the uterine parietes, seems scarcely tenable.

It may be proper to remark that in very young fœtuses of the pig, both the allantoic and amniotic fluids have been found to be saccharine.]

198. Before describing the *circulation in the fœtus*, there are certain anatomical peculiarities which demand our notice: — 1. There is a supplementary vein, situated at the thick edge of the liver, and leading from the umbilical vein to the vena cava ascendens, called the *ductus venosus:* 2. The septum between the auricles is imperfect, having in its centre a valvular oval aperture called the *foramen ovale:* 3. The pulmonary artery, soon after its origin, gives off a branch, the *ductus arteriosus*, which enters the aorta just below its arch. The general effect of these peculiarities is to render the heart virtually a single one, to provide for the quiescent state of the lungs, and to modify the distribution of fresh blood.

Different opinions have been given as to the course of the blood in the fœtus: I shall mention first, Sabatier's and Winslow's. Sabatier's figure-of-8 circulation is thus described by Dr. Flood: — "The blood of the fœtus is conveyed from the placenta by the umbilical veins to the liver, through which it circulates, and then passes into the inferior cava. A portion of it, however, is transmitted, in a comparatively pure state," through the ductus venosus, "which opens into the left hepatic vein, and then into the inferior cava. From the inferior cava the blood ascends into the right auricle, then by the foramen ovale into the left auricle, left ventricle, and arch of the aorta. A portion of the blood thus carried into the aorta descends into its thoracic part; the rest, after circulating through the head and upper ex-

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[[1] Human Physiology, p. 550. [2] Physiological Chemistry, Histology, p. 97.]

tremities, returns by the superior cava to the right auricle, and passes thence into the right ventricle and pulmonary artery. A small part of this blood goes to the lungs by right and left branches; but the rest, conveyed by the ductus arteriosus, joins the blood that we left descending through the thoracic and abdominal aorta, and all that is not employed in the nutrition of the body and lower extremities, is returned by the hypogastric arteries to the placenta." The object of this theory is to show that the head and superior extremities receive a supply of purer blood, which they are supposed to need for their development; but there are great objections in the way:— 1. Even supposing the pure blood were conveyed in the manner stated, it is too small in quantity to answer the purpose, being only one-fifth of the whole: 2. Supposing it to be sufficient, the presumed effects are not produced, the intestines, ribs, etc., being just as perfectly formed at birth as the brain; and 3. No such transmission of pure blood across the auricle, through the foramen ovale, can take place, because of the effects of gravity, the descending current from the superior cava, and above all, because of the active contraction of the right auricle. In Winslow's explanation, it is assumed that the heart is virtually single and the blood mixed. According to him, "The blood of the system generally passes from the superior and inferior cava into the right auricle. One part of this is transmitted through the right ventricle and pulmonary artery, and thence (except a supply for the nourishment of the lungs) through the ductus arteriosus into the descending aorta; a second and larger part passes through the foramen ovale into the left auricle, then into the left ventricle and arch of the aorta, the branches of which supply the head and upper extremities. The continued stream passes into the descending aorta, mixing with that already described; and all of it that is not employed in the nutrition of the body and lower extremities, is reconveyed by the umbilical arteries to the placenta."

Dr. Carpenter, the most recent, as he is certainly one of the ablest, of our physiologists, thus describes the circulation:—"The fluid brought from the placenta by the umbilical vein is partly conveyed at once to the ascending cava by means of the ductus venosus, and partly flows through the vena portæ into the liver, whence it reaches the ascending cava by the hepatic vein. Having been thus transmitted through the two great depurating organs, the placenta and the fœtal liver, it is in the condition of arterial blood; but being mixed in the vessels with that which has been returned from the trunk and lower extremities, it loses this character in some degree by the time it arrives at the heart. In the right auricle which it then enters, it would be also mixed with the venous blood brought thither by the descending cava, were it not that a very curious provision exists to prevent (in a great degree, if not entirely) any such further dilution. The Eustachian valve has been found, by the experiments of Dr. John Reid,[1] to serve the purpose of directing the arterial blood which flows upward from the *ascending cava*, through the foramen ovale, into the left auricle, whence it passes into the *left* ventricle; whilst it also directs the venous blood, that has been returned by the *descending cava*, into the right ventricle. When the ventricles contract, the arterial blood which the left contains is propelled into the ascending aorta, and supplies the branches that proceed to the head and upper extremities before it undergoes any admixture: whilst the venous blood contained in the right ventricle is forced through the pulmonary artery and ductus arteriosus into the descending aorta, mingling with the arterial current which that vessel previously conveyed, and passing thus to the trunk and lower extremities."[2]

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[1] Anal. Phys. and Path. Researches, chapter ix.

[2] Principles of Human Physiology, p. 1035.

["It will be found," remarks Dr. Dalton,[1] whose account of the fœtal circulation is particularly clear and accurate, "it will be found upon examination, that the two venæ cavæ, superior and inferior, do not open into the auricular sac on the same plane or in the same direction, for while the superior vena cava is situated anteriorly, and is directed downward and forward, the inferior is situated quite posteriorly, and passes into the auricle in a direction from right to left, and nearly transverse to the axis of the heart. A nearly vertical curtain or valve at the same time hangs downward behind the orifice of the superior vena cava and in front of the orifice of the inferior. This curtain is formed by the lower edge of the septum of the auricles, which, as we have before stated, is incomplete at this age, and which terminates inferiorly, and toward the right in a crescentic border, leaving at that part an oval opening, the foramen ovale. The stream of blood, coming from the superior vena cava, falls accordingly in front of this curtain, and passes directly downward, through the auriculo-ventricular orifice, into the right ventricle. But the inferior vena cava, being situated further back and directed transversely, opens, properly speaking, not into the right auricle, but into the left; for its stream of blood, falling behind the curtain above-mentioned, passes across through the foramen ovale directly into the cavity of the left auricle. This direction of the current of blood coming from the inferior vena cava, is further secured by a peculiar membranous valve, which exists at this period, termed the *Eustachian valve.* This valve, which is very thin and transparent, is attached to the anterior border of the orifice of the inferior vena cava, and terminates by a crescentic edge, directed toward the left, the valve, in this way, standing as an incomplete membranous partition between the cavity of the inferior vena cava and that of the right auricle. A bougie, accordingly, placed in the inferior vena cava, lies naturally quite behind the Eustachian valve, and passes directly through the foramen ovale into the left auricle. The two streams of blood, therefore, coming from the superior and inferior venæ cavæ, cross each other upon entering the heart. This crossing of the streams does not take place, however, as it is sometimes described, in the cavity of the right auricle, but, owing to the peculiar position and direction of the two veins at this period, with regard to the septum of the auricles, the stream coming from the superior vena cava enters the right auricle exclusively, while that from the inferior passes almost directly into the left auricle.

"It will also be seen, by examining the positions of the aorta, pulmonary artery and ductus arteriosus, at this time, that the arteria innominata, together with the left carotid, and left subclavian, are given off from the arch of the aorta, before its junction with the ductus arteriosus, and this arrangement causes the blood of the two venæ cavæ, not only to enter the heart in different directions, but also to be distributed, after leaving the ventricles, to different parts of the body. For the blood of the superior vena cava passes through the right auricle downward into the right ventricle, thence, through the pulmonary artery and ductus arteriosus, into the thoracic aorta, while the blood of the inferior cava, entering the left auricle, passes into the left ventricle, thence into the arch of the aorta, and is distributed to the head and upper extremities, before reaching the situation of the arterial duct. The two streams, therefore, in passing through the heart, cross each other both behind and in front. The venous blood, returning from the head and upper extremities by the superior vena cava, passes through the abdominal aorta and the umbilical arteries to the lower part of the body, and to the placenta; while that returning from the placenta, by the inferior vena cava, is distributed to the head and upper extremities, through the vessels given off from the arch of the aorta."]

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[1] [Human Physiology, p. 581.]

199. The circulation of the fœtus is independent of that of the mother, though it may be sympathetically affected. By applying the stethoscope to the abdomen of the mother, we can hear the fœtal heart, which beats from 120 to 140 times in a minute; sometimes, but rarely, it is 150 or 160. The sounds audible, however, are double this amount, inasmuch as the beat is double; the first sound is short, feeble, and obscure, the second comparatively loud and distinct; the first is inaudible a little distance from the fœtal heart; the second is audible over a great part of the abdomen, and it is the second which is generally counted; in fact, it is impossible to count both, from their extreme rapidity. The rhythm of these sounds in utero is quite different from what it is in the adult; *i. e.*, the first is quick and the second prolonged, and then an interval nearly equal to the two sounds. Shortly after birth a remarkable change in rhythm takes place; the first sound becomes longer and is about equal in strength and loudness to the second, and the two divide the period of pulsation equally: *e. g.*, if in utero, we divide this period into $\dot{1}$. $\dot{2}$—3. 4 parts; the first and second sound occupy 1. and 2, leaving 3 and 4 for the interval. After birth, the two sounds occur as $\dot{1}$ 2 $\dot{3}$ 4. As the child advances in age, the rhythm is again changed to that of the adult.[1] Dr. M'Clintock has proved, by extensive observations, that the frequency of the heart's action diminishes after birth until it attains the usual standard of infancy.

200. *After birth* remarkable changes take place. From the painful impressions on the surface and senses, efforts are made by the child, which cause inspiration and end in crying, by which means the lungs are more or less inflated, and space is afforded for the pulmonary circulation, which supersedes the use of the foramen ovale and ductus arteriosus: the blood from the lower extremities cannot pass through the umbilical arteries, and does pass through the ascending cava into the right auricle and ventricle, and thence into the lungs, where it undergoes analogous but more perfect changes to those effected in the placenta, and is distributed to the body generally. By degrees, the foramen ovale closes, and the ductus arteriosus, ductus venosus, and umbilical arteries are obliterated; the adult circulation is then established.

Digestion takes place on the reception of food, the liver becomes more active, and the usual excretions of the kidneys and intestinal canal occur.

Before birth, the only sense in exercise was that of touch, but immediately afterwards those of sight and hearing are called into activity, and at a later period those of taste and smell. A considerable time elapses before the sensuous impressions are correctly appreciated, yet every day adds its quota of instruction, and hourly experience at length produces accuracy.

The brain, which was perfectly quiescent during gestation, is now the focus for the impressions produced upon the senses, and the seat of such intellectual operations as can take place at so early a period; and the nervous system generally is the centre to which all organic operations are referrible.

201. In conclusion, I shall briefly notice the so-called *laws of development*. The first of these is the law of *unity of organization*, in virtue of which "the progressive phases of the embryo correspond to the abiding forms, which are preserved in the total organism of animated nature as typical of its gradative evolution; and that as the embryo of each higher animal passes rapidly through the forms of the animals inferior to it, in order to attain its maturity and specific rank of being, that of man is transitively the

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[1] Dublin Quarterly Journal, May, 1855.

compendium of all; not, indeed, without a difference, since in each instance the changing form of the embryo bears the impress of the transitional and incomplete character, while it ever preserves the promise and prophecy of the being into which it is to be finally evolved." This law of transitive development, so eloquently described by Mr. Green in the extract I have quoted from his Hunterian oration, has been established by the researches of Wolff, Otto, Meckel, and other German physiologists; but it is only just to state that the idea was familiar to our great natural philosopher, John Hunter, who remarks: "If we were capable of following the progress of increase of the number of the parts of the most perfect animal, as they are formed in succession, from the very first, to its state of full perfection, we should probably be able to compare it with some one of the incomplete animals themselves, of every order of animals in the creation, being at no stage different from some of those inferior orders; or, in other words, if we were to take a series of animals from the more imperfect to the perfect, we should probably find an imperfect animal corresponding with some stage of the more perfect."

In accordance with this law, we find the fœtal nervous system at the earliest period resembling that of the annelides, then that of the invertebrata, and afterwards that of fishes, reptiles, birds, etc. The same may be said of other organs, and we have already given an example in the case of the uterus (§ 90).

More striking illustrations may be derived from certain abnormal deviations, of which Mr. Green remarks, "and it did not escape Hunter, as a consequence of the same law, that congenital defects, hitherto comprehended under the vague designation of monstrosity, are to be explained by the development of the embryo being interrupted at some early stage of its regular evolution, and that the defective form which is the result, is analogous to the form and structure of an inferior class."

Thus we have the law exhibited in the successive transitions of the fœtus until its arrival at its perfect state; and, if possible, more strikingly illustrated by those exceptions where it fails to attain this perfection.

202. The other law I shall notice has also received its most impressive elucidation from certain exceptions: it is called the *law of symmetry*, conjugation, or affinity, founded upon the general observation that all formations proceed from the circumference to the centre. According to M. Serres, the body generally, and each organ, whether single or double at birth, is originally divisible into two parts, that each half grows towards the mesial line, where it meets its opposite and is joined to it, as we saw in the case of the dorsal and ventral laminæ. If the law of progression be equally observed by both halves, the organ resulting from their union will be perfect; if the growth be unequal, deficient, or excessive, the result will be deformity by defect or excess. Again, connected with this law of symmetry, and perhaps causing its deviations, is the fact, that development of each part of the body is to a certain extent dependent upon its vascular supply; if this be deficient or in excess, so most probably will be the other.

203. We are now able to classify to a certain extent the deviations from the normal formation of the fœtus, viz., into those whose deformity results from an arrest of the transitive development, those arising from irregularity of symmetrical growth, and those dependent upon vascular irregularities. Others still remain, however, the larger class probably depending upon diseased action in the organs or structures of the fœtus or of its dependencies, and some of which it is very difficult to explain at present.

[One of the most remarkable of these congenital defects is the "spontaneous amputation of the fœtal limbs in utero," so well described by Dr. Montgomery of Dublin. Since the publication of his paper in the year

1832,[1] the subject has attracted a good deal of attention in Europe, and also in this country, and several very interesting cases have been detailed: in some, it seems to have been caused by the umbilical cord encircling the limbs and acting as a ligature; in other cases the origin of the ligature has been ascribed by Dr. Montgomery to organized lymph. Professor Gurlt, of the Royal School of Medicine at Berlin, in a paper published by him in 1833, regards "these threads as prolongations of the egg membrane from which the fœtus grows, whether this skin (or membrane) be taken as the navel bladder or the amnion," and "objects to their being considered as formed by organized lymph," as supposed by Dr. Montgomery. "The prolongations of the membrane," Gurlt thinks, "are afterwards, by the constant motions of the fœtus, twisted into slight but firm cords, or threads, which may involve different portions of the fœtal limbs, (as we sometimes find the umbilical cord several times round the neck, or other parts of the child's body,) so as to stricture them, and cause their separation; in this way he explains the presence of the ligatures concerned in the production of spontaneous amputation."[2]]

CHAPTER V.

SIGNS OF PREGNANCY.

204. HAVING now minutely described the process of utero-gestation, let us examine the signs and symptoms to which it gives rise, and by which it may be detected. I need say but little as to the importance of such an inquiry, or of the responsibility which is incurred by a physician, when his opinion is demanded. The honor, and therefore the happiness of a female, may depend upon his decision; the peace of families may rest upon it; and the inheritance of property be controlled by it. The limits of this work oblige me to treat the question rather as a physiological than a medico-legal one; but although much is omitted which might be available in the latter point of view, all that is adduced applies equally to both. In all such cases, the reader is to remember that he may not merely be requested to investigate a case of doubtful pregnancy, where no shame is involved, but that he may be consulted in cases where pregnancy is concealed by unmarried women, or by married women under certain circumstances, to avoid disgrace; and on the other hand, where it is pretended, in order to secure an inheritance, to extort money, or to delay punishment. In considering each "sign," I shall endeavor to state its value as *evidence*, as well as to describe its characters as a *symptom*.

205. The signs of pregnancy have been variously classified, and no doubt in a formal treatise a scientific classification is necessary; but in a brief summary like the present, it appears to me that it will be more useful to take them rather in the order of time in which they are developed; by which means the student will find grouped together the early evidences of pregnancy, and again, those indicative of more advanced gestation.

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[1] [Dublin Journal of Medical Science, vol. i., p. 140.]

[2] [For further information on this curious subject the reader is referred to Dr. Montgomery's essay, contained in his invaluable work on the "Signs and Symptoms of Pregnancy."]

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206. The *general condition* of a pregnant woman is plethoric, the pulse is quicker and fuller, the quantity of circulating fluid is said to be augmented, and its quality altered by the increase of fibrine, judging from the prevalence of the buffy coat in blood taken under such circumstances.

Well-marked sympathies are excited in distant organs, which often amount to distressing irritation, and the nervous system may suffer both primarily and secondarily. Variations in temper and disposition are of frequent occurrence, as well as caprices of taste. The chylopoietic viscera are often deranged, and the secretion from the kidneys altered. The skin may change its color, and become sallow or discolored in patches, though in some cases it becomes more florid, with occasional eruptions on the face. Some women become fat during pregnancy, others lose flesh.

But in some particulars, the deviations from the ordinary state are more remarkable, and constitute the special signs upon which our diagnosis must be grounded; these we shall now notice, premising that the diagnosis of early pregnancy is no easy task, but one which requires great care and discrimination.

207. CESSATION OF MENSTRUATION.—One of the first circumstances which leads a female to suspect that she is pregnant, is the non-appearance of the catamenia at the proper time, and if at the second period they are still absent, it is deemed conclusive, or nearly so.

No doubt this is one of the most unvarying, as it is one of the earliest, results of pregnancy. But, strictly speaking, it is not conclusive, inasmuch as the discharge may recur for some months after conception, or even monthly during the whole period of utero-gestation. Such cases have been recorded by Mauriceau, Puzos, Desormeaux, Johnson, Frank, Dewees, Kennedy, Montgomery, etc., and several such have occurred to myself.[1]

[Dr. Meurer has recorded a remarkable instance of menstruation during pregnancy in a woman, ætat. 27, who was pregnant for the fourth time when he wrote. She always had had her menses regularly during pregnancy, and only during that time. They came on without any illness; and she had always borne healthy children, at the full period. While unmarried, and except during pregnancy, she never menstruated, but she was never unwell from it. Her general appearance was rather masculine.[2] In very many of the cases of supposed menstruation during pregnancy, there is nothing more takes place than a hemorrhage from about the cervix uteri, in consequence of inflammatory ulceration or abrasion of the epithelial covering of this part. Sometimes these conditions precede pregnancy, but are aggravated by the afflux of blood and augmented vascular activity of the gravid uterus, while in other instances they originate during pregnancy. The hemorrhage is often very considerable, and in accordance with a law which, to a certain extent, governs all the capillary hemorrhages of females, it is most liable to occur at or about the catamenial periods.]

Again, conception may take place previous to menstruation, or immediately after ceasing to give suck, before it has had time to occur. Nay, some cases are on record where women menstruated only during gestation.

Lastly, the catamenia may be arrested by disease of various kinds, and it is even possible for pregnancy to occur in such cases.

If, then, menstruation may be suspended by other causes on the one hand, and may continue, notwithstanding pregnancy, on the other hand, it is evident, that by itself, the cessation of menstruation is not a *proof* of conception, although it is of considerable value (inversely as to the frequency of the exceptions) as evidence, especially combined with other signs. I may add, that in cases of concealed pregnancy the woman sometimes stains her linen with blood, in order to simulate this discharge.

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[1] For an explanation of this occurrence, the reader may consult a paper by Dr. J. Matthews Duncan in the Ed. Monthly Journal, April, 1853.

[2] [London Medical Gazette, Nov. 1840, from Med. Correspondenzblatt, Bd. 9, No. 31.]

208. MORNING SICKNESS.—The intimate sympathy between the uterus and stomach, is shown by the irritability of the latter soon after conception. Most women suffer more or less from nausea and vomiting, especially on rising in the morning; hence it is termed "the morning sickness." The irritability may commence immediately after conception, as in two cases mentioned by Dr. Montgomery; but more generally it sets in about the fifth or sixth week, and ceases soon after the third month. The daily attack lasts but a short time, from ten minutes to an hour, after which the patient completely recovers, and is able to take food.

As an evidence of pregnancy, its occurrence at the regular time and in the usual manner, is of great value when combined with other symptoms, but the exceptions and irregularities are sufficiently frequent to render it more doubtful if taken alone; for it may be altogether absent, and yet the patient be pregnant, or if present, it may occur at unusual times, or with extraordinary violence; with some women it occurs during the night only, with others it lasts during the entire day, and may continue throughout the period of gestation. On the other hand, it may be present as morning sickness, from various causes, and yet the patient not be pregnant.

Dr. Ramsbotham remarks, that when vomiting "is entirely absent, utero-gestation does not proceed with its usual regularity and activity;" and so far my experience agrees with his, that irregularities in this particular are frequently followed by deviations in the other symptoms of pregnancy.

["This remark does not entirely correspond with my experience," remarks Dr. Huston, in a note to a former edition. "I have known many women proceed regularly through their pregnancy, and be safely delivered of healthy children, without experiencing the least degree of morning sickness. But where a woman laboring under this disturbance is suddenly relieved, before the usual time for its cessation, there is reason to apprehend some mischief to the ovum, the more especially if she has been exposed to any mental or other cause capable of strongly impressing the nervous or vascular system."

"There is little doubt," says Dr. Montgomery,[1] "that, in general, vomiting is a useful concomitant in pregnancy, and that its sudden cessation is very often indicative of an unfavorable change in the contents of the womb, and of approaching abortion, but I have seen so many instances in which females have been altogether exempt from this affection in several successive pregnancies, through which they have passed most favorably, and gave birth to strong and healthy children, that I must decidedly dissent from the opinion of Dr. Ramsbotham, above quoted, as a general rule, although entertaining the highest respect for its author."]

209. SALIVATION. — The irritation caused by pregnancy may affect the salivary glands, and induce salivation, although it is not of very frequent occurrence. It is enumerated by Hippocrates and the earlier writers as one of the signs of pregnancy; but recent authorities consider it of less value. Cases, however, are mentioned by Dewees, Montgomery, and others. Several such have occurred to myself, in which it commenced at an early period, was very profuse, but unaccompanied by swelling of the glands or tenderness, and ceased spontaneously, in one case, about the fourth month, in another about the fifth, and in a third about the eighth. As Dr. Montgomery has observed, it is "easily distinguished from the pytalism induced by mercury, by the absence of sponginess and soreness of the gums, and of the peculiar fœtor, and by the presence of pregnancy."

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[1] [Signs of Pregnancy, Philadelphia Edition, page 90.]

210. MAMMARY SYMPATHIES. — About two months after conception, the attention of the female is attracted to the state of the breasts. She feels an uneasy sensation of fulness, with throbbing and tingling pain in their substance and at the nipples. They increase in size and firmness, and have a peculiar knotty, glandular feel; the areola darkens, and after some time, a milky fluid is secreted.

But it must be recollected that the breasts may enlarge from other causes; this happens with some women at each menstrual period: when the catamenia are suspended, or after they cease; and at such time a milky fluid may be secreted. Distension of the uterus from hydatids or other causes, is accompanied by a change in the breasts. On the other hand, Gardien and Mahon have remarked, that when menstruation takes place during the early months of gestation, the swelling and pain of the breasts are absent; and Dr. Montgomery mentions a case in which no alteration took place until after delivery, in consequence of the delicate state of the patient's health.

In the virgin state the *color* of the *nipple* and *areola* differs comparatively little from that of the surrounding skin. It is generally a few shades darker, but sometimes scarcely that.

But after conception a great change is observed in most women, though less marked in those of very light complexions. The first alteration perceptible is "a soft and moist state of the integument, which appears raised and in a state of turgescence, giving one the idea, that if touched by the point of the finger, it would be found emphysematous; this state appears, however, to be caused by infiltration of the subjacent cellular tissue, which, together with its altered color, gives us the idea of a part in which there is going forward a greater degree of vital action than is in operation around it, and we not unfrequently find that the little glandular follicles, or tubercles, as they are called by Morgagni, are bedewed with a secretion sufficient to damp and color the woman's inner dress." The above is an extract from Dr. Montgomery's work, to which, and to the plates accompanying it, I beg to refer the reader. This first change in the areola takes place at an early period; Dr. Montgomery states that he has recognized it at the end of the second month. Dr. Houghton of Dudley has mentioned to me the particulars of a case in which he observed it as early as the fourteenth or fifteenth day, and the circumstances leave no doubt that the lady could not have been more advanced in pregnancy. "During the progress of the next two months, the changes in the areola are in general perfected, or nearly so; and then it presents the following characters: a circle round the nipple, whose color varies in intensity according to the particular complexion of the individual, being usually much darker in persons with black hair, dark eyes, and sallow skin, than in those of fair hair, light-colored eyes, and delicate complexion. The extent of the circle varies in diameter from an inch to an inch and a half, and increases in most persons as pregnancy advances, as does also the depth of color." In the centre of the colored circle, the nipple is observed partaking of the altered color of the part, and appearing turgid and prominent, while the surface of the areola, especially that part of it which lies more immediately around the base of the nipple, is studded over and rendered unequal by the prominence of the glandular follicles, which, varying in number from twelve to twenty, project from the sixteenth to the eighth of an inch; and lastly, the integument covering the part appears turgescent, softer and more moist, than that which surrounds it, while on both there are to be observed at this period, especially in women of dark hair and eyes, numerous round spots or small mottled patches of a whitish color, scattered over the outer part of the areola, and for about an inch or more all around, presenting an appearance as if the color had been discharged by a shower of drops falling on the part. Dr. Montgomery fixes the time of this peculiar appearance at about the fifth month, at which time the breasts have become full and firm, with large veins ramifying on their surface. After the sixth month, a number of silvery streaks like cracks may be observed, the result of over-distension.

To these well-marked changes in the areola and nipple there are many exceptions; the color, which is in general the most prominent alteration, may not deepen so decidedly; and many cases of women of light complexion occur, in whom it scarcely differs from the surrounding skin. Besides, as Dr. Ingleby has well remarked, "when the color of the integument around the nipple has been once modified by pregnancy and nursing, it is no longer, I think, a conclusive criterion." Again, in other cases the sebaceous glands are but slightly developed; but I have almost invariably observed the puffy state of the areola in first pregnancies. If the fœtus die, the changes are arrested, and gradually decline.

On the other hand, something resembling the deepened color of the areola, as well as enlargement of the mammary gland, is said to be present, when the uterus is distended from other causes; and I have repeatedly seen the follicles developed in patients neither pregnant nor nursing. Upon the whole, however, the changes in the breasts and nipples are certainly the most unequivocal of all the early signs of pregnancy.

211. *Milk in the breasts*, although a popular evidence much relied upon, can scarcely be considered of any value at all. It is true, we do often find it at an early period, and generally at a later; yet it occurs so frequently without pregnancy, that no certain conclusions can be drawn from it. For instance, Baudelocque mentions the case of a girl of eight years old, who milked her breasts in presence of the Royal Academy of Surgery, October 16th, 1783, and Belloc another; in both, the secretion was apparently the result of the application of a child to the breasts. A similar case, but in a woman, is related by Mr. Semple.[1] Milk is also occasionally secreted at each return of the catamenia, and may remain very long after weaning. Foderè mentions that he has frequently known it secreted at the final cessation of menstruation.[2]

212. From what has preceded, the student will have gathered that the diagnosis of pregnancy in the early months must be more or less doubtful. No single sign can be relied on as conclusive; it is only when two or three are present, and occur in proper sequence, that we can feel pretty certain. For example: if a patient miss one or two periods, we may have grounds for suspicion, and these will be strengthened if morning sickness occur in the second month; but if to these be added enlargement of the breasts and darkening of the areola, the case will be pretty certain. In many cases, too, we may derive assistance from the character and circumstances of our patient. In doubtful cases, it is much better to avoid giving a positive diagnosis until time shall have developed more characteristic signs. It is not, however, until the latter half of gestation that we obtain positive evidence, which can neither be simulated nor evaded. This we shall now consider.

213. **Enlargement of the Abdomen.** — The gradual distension of the uterus has already been described (§ 157) as tolerably equable, enabling us to estimate the period of pregnancy by the height to which it has attained in the abdomen. During the early months, although it be not perceptible above the pubis, yet the abdomen increases by degrees, owing to the intestines being pushed up from the pelvis. This enlargement, however, is varia-

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[1] North of England Med. and Surg. Journal, vol. i. p. 230.

[2] [For an account of several cases of mammary secretion, in both the male and unimpregnated female, the reader is referred to Dunglison's Human Physiology, and Montgomery on the "Signs and Symptoms of Pregnancy," Philad. ed., p. 110, et seq.]

ble, owing to the distention of the intestines by gas or fæcal accumulation. In some cases, the abdomen even becomes flatter at first, from the sinking of the uterus in the pelvis; but it soon increases again, and by the end of the third month it is visibly but equally enlarged. During the fourth month the womb ascends above the symphysis pubis, and may be felt as a rounded tumor, which goes on augmenting till it occupies the whole abdomen. When it reaches the umbilicus, it pushes it forward, so that in the sixth and seventh months it is about level with the surrounding skin, and afterwards it projects beyond it in most women.

The *feel* of the abdomen distended by the uterus is very different from the impression it gives when the distension is caused by fluid, flatus, etc. The uterine tumor is firm, hard, elastic, and defined, preserving its form in all positions of the body, though more remarkably when the patient is upright; whereas in ascites the defined tumor is wanting, the fluid obeys the law of gravitation, and the abdomen has not the same firm, elastic feel. The best mode of examining the uterine tumor, is to make the patient first stand up, and then lie down; this will demonstrate the form of the womb better than keeping in one position; and after lying for some time, the uterine parietes become relaxed and less firm. Percussion will distinguish between pregnancy and tympanites.

Nevertheless, cases do occur which are very embarrassing; for the uterus itself may be distended by air, fluid, or hydatids, and then the form of the uterus and abdomen will be the same as in pregnancy. In such cases, our guide must be the history of the case, and further investigations into the contents of the uterus. I have already described the changes which take place in the cervix (§ 158).

214. QUICKENING. — This term is popularly applied to the mother's perception of the first movements of the fœtus, under the erroneous belief that it was its first movement, as it then became alive or quick. We know that the fœtus is alive from the moment of conception, and have little doubt but that movements take place at a much earlier period. By modern writers, then, the term is applied to the first perception of movement on the part of the mother, which generally occurs about four or four and a half months after conception, though some feel it earlier, and others not till afterwards. Dr. Montgomery observes: "Experience has shown that it happens from the tenth to the twenty-fifth week; but according to my experience, the greatest number of instances will be found to occur between the end of the twelfth and sixteenth week after conception; or, adopting another mode of calculation, between the fourteenth and eighteenth week after the last menstruation." Out of one hundred cases, Rœderer found that eighty quickened at the fourth month, and, of the remaining twenty, some at the third and some at the fifth.

The sensation is at first like a feeble pulsation; and, though so slight, is often accompanied by sickness of stomach and faintishness, or even complete syncope. By degrees it becomes stronger and more frequent, until the movements of the different extremities are distinguishable. Authors are not agreed as to the explanation of quickening, or why the movements are felt at the fourth month or thereabouts, and not earlier. I think, upon the whole, that the most probable explanation is the one which the late Dr. Fletcher, of Edinburgh, used to give in his lectures. "The movements of the fœtus while the uterus is in the cavity of the pelvis are not perceived, because the uterus is not supplied with nerves of sensation, and it is surrounded by parts similarly deficient; but when it emerges from the pelvis, it comes in contact anteriorly with the abdominal parietes, which are liberally supplied with sensitive nerves, and which, by contiguity of substance, feel the movements, and thus the woman becomes conscious of them." This view is strengthened by the fact, of which I have repeatedly been assured, that the movements, unless when violent, are felt in front only.

Its value as a sign of pregnancy is somewhat impaired by the interval which frequently intervenes between the first faint sensations and their repetition; by the late period at which they are felt in some cases; and, in a medico-legal point of view, by our being dependent upon the evidence of the patient herself; or the patient may be deceived by flatus in the intestines. On the other hand, cases occur where no sensation is perceived by the mother. "Of this fact," says Dr. Montgomery, "the writer can speak with certainty, having now in several instances, by applying his hand to the abdomen, distinctly felt the motions of the fœtus in utero, while the mother had no perception of them." In a case lately under my care the movements of the child were exactly similar, and scarcely more felt by the patient at the termination of pregnancy than at quickening, and yet both mother and child were strong and healthy.

215. The *movements of the fœtus* may be felt by the practitioner some little time after quickening, by placing the hand, especially if it be cold, upon the abdomen; and the impression will of course be in proportion to the vigor of the motions. At an advanced period it would not be easy to mistake them; but we may be deceived at an earlier period. Dr. Blundell relates a case of a woman who possessed the power of simulating these movements by the action of the abdominal muscles.

[Dr. Simpson stated, at a meeting of the Edinburgh Obstetrical Society, a variety of observations and experiments, showing that, contrary to the commonly-received opinion, the mere application of cold (as a cold hand, etc.) to the surface of the abdomen of a pregnant woman, had not the effect of exciting motions in the fœtus. The application of portions of ice even, of the size of the hand, had no such effect.[1]]

Dr. Tyler Smith describes two abdominal movements in the latter month of pregnancy; one traversing irregularly over the abdomen, giving a feeling of ridges or prominences to the hand, and the other like a shock or impulse; the former he regards as due to the peristaltic movements of the uterus, and the latter only to the fœtus, and I must confess I think there is great weight in his arguments. I am happy to express my obligations to his work, which I regard as one of the most important and ingenious that has appeared for many years, both as expressing more clearly the "idea" of uterine and ovarian physiology, and also as giving it for the first time the unity of a system.

216. BALLOTTEMENT.—A vaginal examination will enable us to ascertain not merely the state of the cervix, but also to decide upon the presence of a fœtus, by repercussion, or *ballottement*, as it is termed by the French. The patient should be in the upright position; or if she be in bed, her shoulders should be raised; the operator must then introduce his forefinger, and place it upon the cervix uteri, whilst the other hand is employed to keep the uterine tumor steady, then suddenly but slightly jerking upwards the point of his finger, he will feel a sensation of something having receded from it, and which he will perceive to fall again on the point of his finger in a moment or two. The jerk of the finger upon the head of the fœtus causes it to float upwards a little in the liquor amnii, and its own weight makes it descend. Dr. Montgomery justly remarks that "should this be distinctly felt, it is proof positive of a fœtus in utero, there being no other condition or disease of the organ in which a solid body can be felt in this way floating in the

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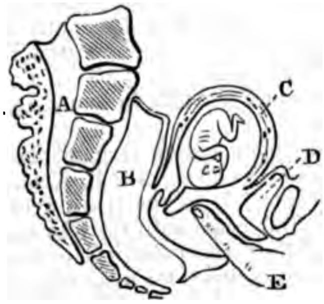
[1] [Monthly Journal of Med. Science, July, 1830.]

cavity." Of course it proves nothing as to the life of the child. The period when this test is most available is during the fifth and sixth months.

[Fig. 79.]



Mode of examination by ballottement.—A. Vertical section of the sacrum. B. Rectum. C. Uterus and ovum. D. Bladder. E. Finger in the vagina, with its extremity pressing up the uterus.

217. Auscultation.—M. Mayor, of Geneva, first applied, in 1818, auscultation to the diagnosis of pregnancy; he was followed, in 1821, by M. Lejumeau de Kergaradec, and, since his time, the investigation has been pursued with zeal and intelligence by Haus, Hohl, Kennedy, Montgomery, Naegelè, jun., Depaul, etc.[1] M. Mayor observed only the sounds of the fœtal heart, but M. Kergaradec detected not only this double sound, but another single, whirring sound, which he called "*bruit placentaire,*" because he believed it to be situated in the placenta. To these two sounds Dr. E. Kennedy has added a third, which is heard only occasionally—the pulsation in the funis. Each of these deserves a separate investigation.

As to the mode of making the examination, it may be effected with the naked ear applied to the abdomen, or by the stethoscope; the latter is preferable, as it enables us to define and limit the sound, and in most instances it is more convenient. The patient, if possible, should be placed on her back in bed, with the head raised, and the abdomen covered only by the night-dress. If there be any doubt, it will be necessary to remove the night-dress and apply the stethoscope immediately to the abdomen. I have repeatedly succeeded in detecting the fœtal heart thus, when the sounds were too faint to be heard through any covering. In this way we can obtain access to all parts of the uterine tumor, except posteriorly, and by turning the patient to one side or the other, we can easily examine the lateral portions. The auscultator should place himself in the easiest posture possible, especially avoiding a dependent position of the head, in which case he would be apt to mistake the throbbing of his own arteries for sounds communicated from the patient. The stethoscope should be placed lightly upon the abdomen, and the pressure be varied, in order to ascertain whether the sounds are in any degree modified by it.

218. The Uterine Souffle, or *bruit placentaire,* is a single intermitting whirring sound, heard over a certain extent of the uterine surface. It has been compared to the sound of a pair of bellows, to that made by gently blowing over the mouth of a bottle, and to that heard when a shell is applied to the ear, etc. Perhaps the best comparison is with the "*bruit de soufflet*" of the heart, which is doubtless sufficiently familiar to all. Dr. E. Kennedy remarks, that it assumes all the variations of the latter sound—viz., the rasping or sawing sound, the musical or hissing sound, a sound resembling

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[1] By far the most complete account of obstetric auscultation will be found in the work of M. Depaul, Traité Théorique et Pratique de l'Auscultation Obstetricale. Paris, 1847.

the cooing of a dove, and a drone resembling that of a bagpipe, accompanying the sound, yet without interfering with it.

It is stated by Hohl and others to be limited to the situation of the placenta (§ 175), and so it is generally; but in many cases it extends to some distance, and in others, according to Naegelè, it may be heard in almost any part of the uterus: he further states, that it may constantly be heard at the lower part of the uterus, by applying the stethoscope near Poupart's ligament. I cannot say that I have been able to verify the latter statement, but I have found it very possible to produce a souffle in that situation by a little extra pressure of the stethoscope.

219. The period when it first becomes audible is about the fourth month, according to Montgomery, Hohl, and Naegelè; Dr. E. Kennedy states that he has succeeded in detecting it as early as the tenth week; and, on the other hand, it cannot be heard in some cases until the fifth month. It may, however, always be distinguished before the pulsations of the fœtal heart; and even when the fœtus perishes, it continues for some time afterwards. It is feeble when first heard, but increases in intensity and strength; the intensity, however, is subject to some variation. It is synchronous with the mother's pulse, and subject to its varieties, but without impulse. During labor its intensity varies; in the upper part of the uterus it is frequently inaudible during a pain; after delivery it ceases entirely, though not always instantly.

220. M. Kergaradec, as I have already said, placed the seat of this sound in the placenta; more recent investigations, however, have decided that it is situated in the uterus. M. Ulsamer and Dr. E. Kennedy conceive it to result from the difference between the calibre of the arteries supplying the uterus and the uterine sinuses: that the expanding current of blood rushing from an artery into a larger sinus gives rise to the sound, just as the passage of blood through a constricted valve of the heart or aorta does to the *bruit de soufflet.* M. Depaul and M. Caseaux also place its seat in the uterus, and the latter authority considers that it is in part, at least, owing to a "serous polyhæmia," as advocated by M. Beau.[1] Other explanations have been given, but all are agreed now that its seat is in the uterus, and not in the placenta; and most, I believe, that it indicates the position of the latter organ.

221. As a test of pregnancy, its *positive* value (that is, its being audible) is very great, though not quite conclusive, as it is heard sometimes in cases of disease, of which I had a remarkable instance under my own care, and may occasionally be produced by too great pressure of the stethoscope upon an artery. Neither does it prove that the fœtus is alive, in cases of pregnancy, as it is observed to persist for a short time after the death of the child; it is heard also in some cases of blighted ova which have degenerated into moles, and in cases of hydatids.

On the other hand, its *negative* evidence (our not being able to detect it) is of much less value, as we may not be able to hear the sound although the patient be pregnant, probably from the placenta being attached posteriorly.

In 212 cases, M. Jacquemier found it present in 80 cases, and absent in 132. In 600 cases M. Naegelè heard it 238 times on the left, 141 times on the right side, and in 20 cases it was absent.

222. PULSATION OF THE FŒTAL HEART.—Very different from the uterine souffle is the sound which attracted the attention of M. Mayor, the pulsation of the fœtal heart. It consists of a rapid succession of short, regular, double pulsations, differing from those of the adult heart in rhythm and frequency. The sound is like the muffled ticking of a watch, or, as Naegelè

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[1] Archiv. Gén. de Méd., 1850.

remarks, like the pulsations of the heart of a new-born child. Their frequency is about double those of the adult, or from 120 to 140 pulsations in a minute—*i. e.*, 240 to 286 audible sounds; but in counting, we reckon the second sound only, as it would be impossible to count both, and the second is the loudest. I have already described (§ 199) the peculiarities of the double sound in the fœtal heart, with the change of rhythm which takes place at birth, and which I need not here repeat. M. Naegelè, jun., found that, in 600 cases, the average frequency was 130 (*i. e.*, 260 sounds) strokes in a minute.

The variations in strength and rhythm of the pulsations of the fœtal heart are very nmerous, and not easily explained; no doubt many are caused by changes in the condition of the fœtus itself, and others by impressions received from the mother; for although the fœtal circulation is independent of that of the parent, yet there is so intimate a sympathy, that disturbances in the maternal system are communicated to that of the fœtus, some (in case of sudden shocks) immediately, and others (in case of disease) more tardily.

The situation in which the fœtal heart is heard most distinctly, is about the middle, or inferior abdominal region, more frequently on the left than on the right side. "The extent of surface," says M. Naegelè, jun.,[1] "over which the beating of the heart is heard, cannot be accurately defined in inches and lines, but it is certainly audible through a larger space than most observers have represented. Its sounds reached beyond the linea alba towards the other side, in one hundred and eighty-five of three hundred and seventy cases, in which the position of the fœtus with its back to the left side of the mother was distinctly ascertained by the ear, and afterwards verified by the result of the labor; in forty-six, they were audible over nearly the whole abdomen; while in one hundred and thirty-seven, they were confined to the left side, and did not reach the mesial line. The heart's sounds were audible beyond the mesial line, only in forty-five of one hundred and eighty-five instances, in which the back of the fœtus was directed to the right side; one hundred and fourteen times they were distinguishable on the right side only; but in twenty-six they extended over the whole abdomen. In all these instances in which the heart's sounds were not limited to one lateral half of the abdomen, their greater intensity at one part indicated the situation of the back, and consequently the position of the fœtus."

So far as the second sound of the fœtal heart is concerned, my experience agrees with that of M. Naegelè, but I have found that the first sound becomes inaudible at a very moderate distance from the situation of the fœtal heart.

The earliest period at which the pulsations can ordinarily be detected, is the middle of the fourth month, or the beginning of the fifth. Dr. E. Kennedy has heard them in a few instances before the expiration of the fourth month. Dr. Montgomery names the end of the fifth month. The earliest period mentioned by Naegelè, is the eighteenth week, in thirty out of fifty patients who were examined before the middle of pregnancy. In some cases they did not become audible before the fifth month. It is easy to conceive that various circumstances may impede the transmission of the sound, and so alter the time at which it would otherwise be first heard, as, for example, excess of liquor amnii, thickness of the abdominal parietes, or feebleness of the fœtus.

223. When the pulsation of the fœtal heart is heard, it is proof positive of pregnancy, equally remote from imitation or evasion. The only circumstances at all likely to embarrass us for a moment, are the sounds of the maternal heart, which may sometimes be heard; the sound of the contraction of the abdominal muscles; or of the uterine arteries; but the greater

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[1] On Auscultation, translated by Dr. West, p. 41.

rapidity, the rhythm, and the clearer, though feebler, sound of the fœtal pulsations will distinguish them with facility.

On the other hand, the pulsations being inaudible is not conclusive proof that the patient is not pregnant, as the child may have died, or, as in some rare cases, they may be inaudible for a time, though the fœtus be living. I know this to be the fact, though I cannot explain it. M. Depaul mentions that in 906 cases it was only absent in eight cases.

In some rare cases of pregnancy the pulsations of the aorta are heard, or rather felt, even beyond the fifth month; but why they are thus transmitted I cannot say. As a general rule, if they are distinctly heard, it is good evidence that the patient is either not pregnant, or that the uterus has not risen up out of the pelvis.

224. PULSATION OF THE UMBILICAL CORD, or *funic souffle*.—If the position of the funis be favorable, as, for instance, if it be twisted round the neck, body, or limbs of the fœtus, or in any way placed between the fœtus and the anterior or lateral parietes of the uterus, it is quite possible, as Dr. E. Kennedy has shown, to hear the pulsation of its arteries corresponding to the fœtal heart's action. Both Haus and Hohl have denied this, but without just reason, in my opinion; for Dr. E. Kennedy states that "in some cases where the parietes of the uterus and abdomen were extremely thin, he has been able to distinguish the funis by the touch externally, and has felt it rolling under his finger, and then applying the stethoscope, its pulsations has been discoverable, remarkably strong." Professor Naegelè, jun., agrees with Dr. E. Kennedy as to the seat of the pulsation, and attributes it to the tortuosity of the arteries, and to the dilatations observed in them. Occasionally the sound is rather a souffle than a pulsation, but fainter than the uterine souffle, and distinguished from it by its being synchronous with the pulsations of the fœtal, and not the maternal heart. Dr. E. Kennedy found that he could produce the souffle by pressing slightly upon the cord with the edge of the stethoscope.

225. We have now examined the principal signs developed during the latter half of pregnancy — to wit, enlargement of the abdomen, quickening, the motions of the child, ballottement, and the results of auscultation; and we find that whilst all are valuable, there is a degree of uncertainty attached to the first three which calls for a very careful estimate on our part: that the *positive* evidence of the latter modes of investigation is conclusive, but that the *negative* evidence, or absence of the usual results, is not proof that the patient is not pregnant. So that, as was before observed, we ought rather to depend upon the coincidence of two or more of the signs of pregnancy, than attempt a diagnosis from any one alone: the only sign indeed which can be regarded as proving that the woman is pregnant of a living child, is the pulsation of the fœtal heart.

226. KIESTEINE. — There are two other signs which I have deferred noticing until now, because they require more research to entitle them to a place among the recognized evidences of gestation, and it seemed better that the student's attention should rather be directed to those considered valid, than embarrassed by doubtful ones. The first of these tests is derived from the urine. M. Nauche was the first who accurately described the change which takes place in the urine of pregnant women. He found that "by allowing the urine to stand for some time, in thirty or forty hours a deposit takes place of white, flaky, pulverulent, grumous matter, being the caseum, or peculiar principle of the milk formed in the breasts during gestation." This deposit has lately received the name of *Kiesteine*. M. Eguisier has published the result of his researches on the subject.[1] He states

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[1] Lancette Française, Feb., 1839, p. 36.

that "the urine of a pregnant woman, examined in the morning, is generally of a pale yellow color, and slightly milky; it first reddens, and then turns blue the '*papier tournesol,*' as ordinary urine. Exposed to the contact of air, a cloudiness is observed from the first day, resembling fine wool; from the first day, also, a white matter is deposited. These phenomena are not, however, constant. From the second to the sixth day, small opaque bodies are seen rising from the bottom to the surface of the fluid, and then collecting together until they form a layer, covering the whole surface: this is kiesteine. It is sufficiently consistent to be raised from off the fluid. It is whitish, opaline, slightly granular, and resembles much the layer of fat which swims on the surface of fat broth when cool. Examined by the microscope, it appears a gelatinous mass of indeterminate form. When it is old, cubical crystals are sometimes detected." "It persists thus for three or four days; the urine then becomes troubled; small portions are detached from its surface, and sink to the bottom, until the layer is entirely broken up. Kiesteine appears to exist in the urine from the first month until the period of delivery." Dr. Montgomery seems to think this appearance constant, when the deep color and turbid condition of the urine permit of observation.

Dr. Golding Bird has published a series of experiments on this subject,[1] which confirms the value of this test. The pellicle formed in the urine of twenty-seven out of thirty pregnant women, and it was found only in two instances out of a number, in the urine of unmarried women. I shall quote his conclusions: — "1. That certain organic matters, closely resembling, if not identical with, caseous matter, mixed with abundance of the earthy phosphates in a crystallized state, are eliminated from the blood during pregnancy; and if not otherwise removed, or taken up, are finally thrown out of the system by the kidneys. 2. That certain accidental circumstances, especially connected with those morbid actions in which the kidney is called upon to perform a compensating function for the skin, as indicated by the abundance of azotized matter, in the form of amorphous lithate of ammonia, in the urine, interfere temporarily with the development of caseous matter, as they do in checking the cutaneous and other secretions. 3. That, taken in connection with other symptoms, as the formation of a dark areola round the nipple, and cessation of menstruation and abdominal enlargement, the formation of a caseous pellicle in the urine affords a very valuable corroborative indication of the existence of pregnancy."

This subject has been investigated by the late Dr. E. K. Kane, in the Philadelphia Hospital, and he has arrived at the following conclusions: — 1. That kiesteine is *not peculiar* to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge at the mammæ. 2. That though sometimes obscurely developed, and occasionally simulated by pellicles, it is generally distinguishable from all others. 3. That when pregnancy is possible, the exhibition of a clearly defined kiesteine pellicle is one of the least equivocal proofs of that condition: and, 4. That when this pellicle is not found in the more advanced stages of supposed pregnancy, the probabilities, if the female be otherwise healthy, are as 20 to 1 (80 to 4) that the prognosis is incorrect.[2]

227. JACQUEMIER'S TEST. — This consists in a violet color of the mucous membrane of the vagina and vulva, dependent probably upon pressure above. M. Parent-Duchatelet confirms the result of M. Jacquemier's observations, which he states were made upon a large number of pregnant women, and that the change of color was never absent. I had lately an opportunity of minutely examining a well-marked case, and found that the violet color was caused by a great number of minute veins in a varicose condition.

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[1] Guy's Hosp. Reports, No. 10.

[2] American Journal of Med. Science, July, 1848.

This, however, is denied by Dr. Wistrand, as he has not found the livid color following the course of the veins, but extending uniformly over the entire mucous membrane. He regards it as owing to the hyperæmic congestion, produced by compression of the utero-pelvic veins, and that it may be perceived towards the close of the second month, becoming more evident during the third and fourth.[1] Malvani, Heiberg, Sperind, regard this as a never-failing sign of pregnancy, and Dr. Wistrand agrees with them. Hnguier states that it is not found in any other state than pregnancy; but, on the other hand, Lange thinks that it does not occur in so marked a degree in all pregnant women, that it can certainly be distinguished from similar changes of color from other causes.

228. Twin Pregnancy. — The inadequacy of the signs which are commonly stated to indicate plural pregnancy, must have been felt by every accoucheur. Those upon which the greatest reliance is placed are, the disproportionate size of the abdomen compared with the period of gestation; the flattened state of the abdomen in front, with the appearance of being divided into halves; the inequality of its surface; the tumultuous movements of the fœtus; the inordinate weight and distension; and the excessive œdema of the lower extremities. No doubt many of these circumstances may be observed in twin pregnancy, yet none of them are sufficiently distinctive, while several may arise from other causes. An additional difficulty may arise from one of the fœtuses dying, and yet being retained along with the living one until the full time.

M. Hohl has remarked that in twin cases the uterine soufle is heard "over a larger surface, with greater intensity and more varied tone;" but in ten twin cases observed by Naegelè, jun., no variation in this sound was observed sufficient to excite suspicion of twins.

The only sign upon which reliance can be placed, is, as Dr. E. Kennedy has pointed out, the hearing the pulsation of two fœtal hearts, equally distinct, and at a distance from each other, especially if the number of pulsations should be different in the two situations.

"Usually," says Naegelè, "the beating of one heart is heard in the left or right inferior abdominal region, while that of the other is audible in the superior abdominal region of the opposite side. But it never happens, be the position of the children what it may, that the beating of the two hearts is heard on the same horizontal plane. It is the more important to bear in mind the different situations of the two hearts, because their action is often synchronous.

CHAPTER VI.

DURATION OF PREGNANCY.

229. What is the ordinary term of gestation, and what may be the deviations from it? Such are the questions to be briefly discussed in the present chapter, rather in a physiological than a medico-legal point of view; for full particulars, I refer the reader to Beck's and Taylor's Jurisprudence, and Montgomery's Essay on the subject.

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[1] Dublin Quarterly Journal, vol. xiv. p. 449. *New Series.*

The first point to be settled is the ordinary term of utero-gestation; and we are met at the outset by the difficulty of obtaining accurate data. The common mode of calculation is from a fortnight after the last menstruation; and the period so fixed is corrected by the time at which quickening occurs. In many instances this proves pretty correct; in the majority, I think, it is rather overrun; and, at any rate, the uncertainty as to the period of conception, and the variation in the time of quickening, are sufficient to render the computation no more than an approximative estimate.

Cases, however, occasionally occur, where conception follows a single coitus, and if they were sufficiently numerous, they would settle the question; but they are rare. Dr. Montgomery relates the case of a lady who went to the sea-side in June, 1831, leaving her husband in town. He visited her for the first time November 10th, and returned to town the next day. She quickened on the 29th of January, 1832, and was delivered August 17th, exactly two hundred and eighty days from the time of conception.

The deductions from such cases, and from general calculation, have led to fixing the term of gestation at ten *lunar* months, or nine calendar months and one week, or forty weeks, or two hundred and eighty days, allowing for some variation either way. In an able and interesting paper,[1] Dr. Matthew Duncan disputes the accuracy of this calculation, and maintains the truth of Harvey's statement that 275 days is the normal period of pregnancy, and that the patient will be confined after ten lunar months, on the day the catamenia would have appeared, had she not been pregnant. If we take the average of cases when the period of fruitful coitus can be ascertained, it will certainly fall short of 280 days.

230. But then, allowing for the uncertainty of the ordinary data, or supposing the "*point de départ*" unquestionable, are we to conclude that the actual duration of pregnancy is determinate and invariable? We know that it may be accidentally abbreviated without destroying the child, from various causes, but then this is not the natural course. In some cases, also, the natural duration may be within the limits here laid down; for example—in Dr. Girdwood's case, the period was 274 days.[2] Dr. Rigby gives three cases of 260, 264, and 276. Dr. Lockwood, four cases, of 270, 272, 276, 284 days.[3] There is a case in the American Journal of 272 days.[4] Dr. Reid[5] mentions cases at 276; three of 274, one 275, 273, 271, 278, 263, 280, 264, 274, 276, 280; two of 266, 265, 272, 275, and 271 days; and in all these there appear sufficient grounds for believing in their accuracy, most of them being the result of a single coitus. On the other hand, *May it also be prolonged?* So much diversity of opinion has obtained on this point, that it is very difficult to come to a satisfactory conclusion. In the celebrated Gardiner peerage case, the most eminent accoucheurs in the country were arranged on opposite sides. Drs. Gooch, R. Blegborough, Davis, Sir C. M. Clark, and Mr. Pennington, discrediting protracted gestation; and Drs. Granville, Conquest, Blundell, Merriman, Power, Hopkins, etc., advocating its possibility.

Dr. Dewees remarks: "I have had every evidence, on this side of absolute proof, that it has been prolonged to ten calendar months, as an habitual arrangement, in at least four females; that is, each went one month longer than the calculations made, from an allowance of ten or twelve days after the cessation of the last menstrual period; and from the quickening, which was fixed at four months." Professor Desormeaux relates a case of a lady whose pregnancy lasted nine months and a fortnight. The late Professor

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[1] Edin. Med. Journal, Nov. 1856.

[2] Lancet, Dec. 1844.

[3] Amer. Journal of Med. Science, Dec. 1847.

[4] Ibid., April, 1842.

[5] Lancet, July 20th, 1850.

Hamilton, of Edinburgh, declares his "solemn conviction, that he has met with at least twelve cases, in the course of practice, where there could not be the shadow of doubt of the protraction of human pregnancy beyond the ordinary period." M. Velpeau has recorded nine cases of the kind.

To these authorities may be added the names of Harvey, Smellie, Zacchias, La Motte, Le Roi, Le Bas Foderè Capuron, Gardien, Murat, etc.

Dr. Montgomery relates two cases in his work, one of which came under my observation; in the first the gestation continued two hundred and ninety-one days, and in the second forty-one weeks and two or three days at least. I have referred to some of the cases on record, because, the question being chiefly one of authority, positive evidence must infinitely outweigh mere negation.

In the case of Anderson *v.* Whittaker, gestation[1] had lasted 283 days from the only coitus, and in Dr. Lee's case 287 days;[2] Dr. Beatty's[3] case was 291 days; Mr. Skey's 293; Dr. Ashwell's, 300 days; Dr. M'Ilvain's, 293; Dr. James Reid's, 287 and 293.

[It is very certain that there are well-authenticated instances on record in which the period of gestation has been extended beyond the usual term. In the cases of *single intercourse*, 293 days form the longest period, or eighteen days beyond what is deemed to be the usual average duration of pregnancy in the human female. Now it is a coincidence with the results of Lord Spencer's tables, that of the 764 cows whose data were so accurately noted, the greatest excess beyond the average term of gestation in them (285 days) was also eighteen days. In a case related by Dr. Ashwell, of a prolongation of gestation to the 300th day, the exact date of impregnation is not given; it is stated that the husband left a few days after the catamenial period; now as this is the only case of pregnancy extending to 300 days, some, perhaps, may doubt the exactness of the husband's statement as to time.

With a view to ascertain the experience of those who were most likely to have paid particular attention to this subject, upwards of forty of the most eminent obstetric practitioners in London, Dublin, and Edinburgh, were applied to by Dr. Reid. The large majority of these expressed a firm conviction as to the occasional extension of the usual period of pregnancy by a few days beyond 280. Several had met with one or two cases of protracted gestation, out of many hundred, on the exact data of which they could rely; others, who had not kept notes of their cases, could not positively speak to facts, but had no moral doubt as to the period being extended in some instances. Some, who have had extensive experience in private and hospital practice, stated that they had never met with an undoubted case of protracted gestation; whilst two affirm it as their strong conviction, that no case ever exceeds the 280th day from conception, and one, that it is never carried beyond the ninth calendar month.

In order to show that no other data than the calculation from a single coitus is to be depended upon to fix the commencement of pregnancy, Dr. Reid presents the following table, the result of 500 cases, in which the exact number of days intervening between the last day of menstruation and that of parturition is shown. With the exception of about 50, they were private cases, in which the data were most correctly kept; and the others were selected from upwards of 1000 hospital and dispensary cases, presenting an equal certainty as to date, in females superior to the usual class of hospital patients.

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[1] Lancet, July 20th, 1850.

[2] Med. Gazette, 1831.

[3] Dublin Med. Journal, vol. viii.

	Days.	Cases.	
37th week.	252	4	23 cases.
	253	1	
	254	3	
	255	1	
	256	2	
	257	4	
	258	4	
	259	4	
38th week.	260	6	48 cases.
	261	5	
	262	3	
	263	9	
	264	10	
	265	5	
	266	10	
39th week.	267	9	81 cases.
	268	13	
	269	5	
	270	13	
	271	12	
	272	13	
	273	16	
40th week.	274	21	131 cases.
	275	20	
	276	16	
	277	16	
	278	22	
	279	21	
	280	15	
41st week.	281	18	112 cases.
	282	25	
	283	14	
	284	15	
	285	14	
	286	15	
	287	11	
42d week.	288	17	63 cases.
	289	8	
	290	9	
	291	14	
	292	6	
	293	3	
	294	6	
43d week.	295	2	28 cases.
	296	5	
	297	8	
	298	6	
	299	1	
	300	2	
	301	4	
44th week.	302	1	8 cases.
	303	1	
	304	2	
	305	1	
	306	0	
	307	1	
	308	2	
45th week.	309	0	6 cases.
	310	1	
	311	1	
	314	1	
	315	2	
	316	1	
	Total,	500 cases.	

In the case which occurred 314 days after the cessation of the catamenia, it is noted that quickening did not happen until the 6th month, proving, in Dr. Reid's opinion, that conception had taken place later than had been thought. Had minute investigation been made, at an early period, into the remaining five cases which went beyond the 44th week, it is most likely that similar facts might have been observed.

It will be seen that the above table agrees with that of Dr. Merriman (114 cases), in showing that the greatest proportion of women complete the period of gestation in the 40th week after the cessation of the catamenia, and a very considerable number in the 41st week.

In Dr. Murphy's table of 182 cases, the numbers born in the 39th and 40th weeks were about equal, being 24 and 25; whilst the greater proportion (*thirty-two*) were in the 41st week, and 25 in the 42d week — equal to those in the 40th.

In Dr. Reid's table the 282d day was that on which the largest actual proportion of the patients were delivered; but the number from the 274th to the 282d day ran so near to each other that we must rather take that as the average period. If we allow a range of from two to six days after menstruation, as elapsing probably before conception takes place, it will then appear that about the 39th week after impregnation is most probably the ordinary duration of pregnancy; and this will coincide with the result of the table taken from cases of single coitus.

In a note to a former edition of this work, Dr. Huston states that he has known at least two instances in which he had the strongest reasons for believing that gestation extended, in one case two weeks, and in the other three weeks, beyond the usual period, or nine calendar months.]

231. An additional argument has been deduced from the irregularity of the period of gestation among cattle. According to the researches of M. Tessier: out of 160 cows, 14 calved from 8 months to 8 months and 26 days; 3 at 270 days; 50 from 270 to 280 days; 68 from 280 to 290 days; 20 at 300, and 5 at 308 days; the extremes being thus 67 days apart. Of 102 mares, 3 foaled on the 311th day; 1 on the 314th; 1 on 325th; 1 on the 326; 1 on the 330th; 47 from 340 to 350 days; 25 from 350 to 360; 21 from 370 to 377, and one on the 394th day; the extremes being 83 days. With sows, the extremes were 15 days; and with rabbits (out of 139 cases) 7 days.

[Recently, Earl Spencer has communicated the results of his observations for a number of years on cows, to the English Agricultural Society.[1] Of 764 cases, 314 calved before the 284th day, 310 after the 285th, and only 16 after the 295th; so that the probable period of gestation, he thinks, ought to be considered 284 or 285 days.]

232. In conclusion, there is no doubt that the usual period of gestation may be *anticipated* by at least two months, without necessary injury or death to the infant; and it appears to me that the evidence we possess, as well as the weight of authority, is in favor of occasional protracted gestation; and that, to use the words of Dr. Montgomery, I "cannot imagine why gestation should be the only process, connected with reproduction, for which a total exemption from any variation in its period, should be claimed."

But on the other hand, it must be confessed that many of the cases adduced are valueless, because founded on data which are necessarily uncertain; and I should be unwilling to admit any as conclusive, occurring in persons exposed to frequent intercourse, and calculated in the ordinary manner.

Dr. Clay, of Manchester, has recently published some facts tending to show that the duration of gestation depends much upon the age of the parents; that the younger the parents, the shorter the pregnancy, and *vice versâ*, and this he conceives will explain the variations that have been observed. In this calculation he takes the mean age of both parents, allowing something either way for the earlier maturity of the mother.

CHAPTER VII.

STERILITY.

233. Having thus completed the history of conception and utero-gestation, we shall now consider certain abnormal deviations from the ordinary course of these functions; and the first in order is *sterility*, or inability to conceive.

The *causes* of this defect have been divided into functional and organic, into curable and incurable; into those which cause sterility, properly so called, and those which merely occasion impotence. Without adopting any special classification, I shall enumerate the organic and incurable cases first, and then the curable, whether functional or organic; and adding other causes, not included in either class.

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[1] [Journal of the Agricultural Society, part ii. 1839.]

234. The *absence of the ovaries* will render the person incurably sterile, as will also the absence of one and disease of the other, or the disorganization of both. Cases of this kind are not infrequent. Disease of the substance of the ovary may be extended to the Graafian vesicles, or they may be congenitally deficient, and so conception be prevented. "The most frequent variety of ovarian disease," says Dr. Davis, in his Obstetric Medicine, "which we may suppose calculated to produce this effect, is that of an obviously morbid enlargement of the vesiculæ Graafianæ, accompanied by a degenerated structural condition of their parietes."

235. The *fallopian tubes* may be congenitally deficient or imperforate, though such cases are extremely rare. Their canal may be obliterated from acute or chronic inflammation, or their fimbriated extremities may become adherent to the ovaries. Even though not imperforate, yet the canal may be filled with adventitious matter.[1] In all these cases, sterility is the consequence, because the contact of the spermatozoa with the ova is prevented: and notwithstanding the daring proposal of Dr. Tyler Smith, I fear it must still be classed among the incurable causes. Dr. Tilt considers subacute inflammation of the ovaries and fallopian tubes as a curable cause of sterility.[2]

[According to Dr. Tilt, the manner in which subacute ovaritis becomes a cause of sterility is by the production—

1. Of morbid lesions of the stroma, or of the vesicles of the ovula therein contained.
2. Of a false membranous deposit lining the ovaries, so as to preclude the exit of the ovula.
3. Of lesions in the tubes destined to convey the ovula to their uterine abode. He likewise stated that sterility was sometimes produced by the uterine extremities of these tubes being blocked up by a glutinous deposit.

Dr. Tilt has given the history of three cases in which the diagnosis of the disease was fully confirmed, by an accurate examination of the patient through the rectum, and the treatment recommended caused a cessation of the sterility after it had lasted five, six, and seven years. The remedial measures prescribed were, leeches, to diminish the chronic ovarian congestion; blisters, to break the chain of morbid nervous action, fostered by long habits of suffering; mercurial ointment, combined with narcotic extracts and camphor, to reduce pain and vascular action; medicated enemata were also administered with the same intention.[3]]

236. The *uterus* may be absent, of which numerous cases are recorded; or it may be undeveloped, which Dr. Vanoni considers a cause of sterility. If present, its cavity may be partially or wholly obliterated, as was noticed by Morgagni, Baillie, and Mott; these cases are of course incurable. The canal of the cervix may be impervious, or its mouth covered by membrane, as in many cases on record; but though sterility results so long as it continues, it is within reach of treatment, and may be cured by puncturing.

Diseases of the uterus, such as carcinoma, polypus, prolapsus, etc., are enumerated among the causes of sterility, but erroneously, I think. Madame

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[1] Lancet, May 19th, 1849.

[2] London Journal of Medicine, vol. i. p. 1166.

[3] [The views of Dr. Tilt on this subject are fully developed, and illustrated by an extended series of observations, in his treatise on "Diseases of Menstruation, and Ovarian Inflammation, in connection with Sterility, Pelvic Tumors, and Affections of the Womb."]

Lachapelle, Dr. Davis, Dr. Oldham, and others, have related cases of conception and delivery, notwithstanding the existence of scirrhus and even open cancer.

M. Chopart mentions a case of complete prolapse, which proved no bar either to intercourse or conception. Many cases of polypus discovered during labor, or causing abortion, have been met with; several have occurred to myself.

Inversion of course involves sterility; and the same may be said when the cavity of the uterus is occupied by fluid or solid matters, and the os uteri closed, as in physometra, hydrometra, moles, etc., but these belong to the curable causes. I have seen a case in which the uterus was bound down to the left side of the pelvis in consequence of a pelvic abscess which followed her first confinement. She has since been sterile, and I think that is the cause.

237. The *vagina* may be absent, imperforate, or partially adherent. Some of these cases are curable by careful incision and separation, as in Dr. Physic's and M. Amussat's cases.[1] Again, it may be the seat of callosities, cicatrices, tumors, etc., and by them be partially closed, offering an obstruction to copulation; but they, also, may generally be relieved by an operation. Extreme narrowness of the canal is seldom the cause of impotence, as it is generally overcome; but extreme shortness is considered as occasionally an incurable cause, though I rather think without sufficient reason, as, though short, it may not be sexually disproportionate. Closure of the orifice of the vagina by membrane is an effectual impediment to coition, and, until removed, to conception; but partial closure may admit of conception. I have attended three ladies in their confinement, in whom the hymen was perfect, the perforation barely admitting the tip of my finger, and the membrane was strong enough to resist the pressure of the head for a considerable time.

238. Functional derangements do not necessarily produce more than temporary sterility. I have seen patients conceive with very scanty menstruation, and I have known them conceive when both sexual desire and gratification were wanting; but as yet I have never known patients other than sterile in whom sexual desire is absent and menstruation deficient. The variety of *dysmenorrhœa* in which lymph is secreted, is considered by Denman and others to preclude conception; this, however, is not universally the case, and the disease in many cases is curable.

Congestion, erosion or ulceration of the cervix uteri, uterine leucorrhœa when excessive, and perhaps vaginal leucorrhœa, may also be included among the curable causes of sterility. The same result obtains temporarily, in cases of irritable uterus, and some diseases of other organs. Mr. Whitehead has lately suggested that the uterine mucus, instead of being alkaline, as in its healthy state, may be rendered acid by certain affections of the uterus; and as the researches of M. Donnè have shown that spermatozoa lose their vitality sooner in acid mucus, it may be a frequent cause of sterility.[2]

Unsuitable marriages, whether as to disparity of age or constitution, often prove unfruitful: cases are on record of parties who together were sterile, being both fruitful with other individuals. Excessive sexual indulgence often defeats its object.

239. I have thus cursorily noticed most, if not all, the appreciable causes of impotence and sterility in the female.

There is, however, a considerable class of unfruitful marriages of which no explanation can be given; we can only conjecture that the ovaries or fallopian tubes are defective, or that some sexual incompatibility exists.

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[1] Gream: Lancet, 1849, vol. i. pp. 91–204. Churchill's Diseases of Women.

[2] On Abortion and Sterility, p. 406.

The uterus and vagina are within reach of an examination, and their condition can be minutely ascertained by means of the finger, the speculum, and bougies.

CHAPTER VIII.

SPURIOUS PREGNANCY—PSEUDO-PREGNANCY.

240. It may not be unprofitable here to say a few words upon that curious and obscure disease which has received the above names, and which Dr. Simpson has proposed to call "pseudo-cyesis."

Isolated cases of the disease have probably occurred to most men in extensive practice, and numbers of them have been recorded by ancient and modern writers, but the most, if not the only, complete monograph on the subject is a lecture by Professor Simpson,[1] and I think he will forgive the ample use I must make of it in this chapter.

241. The phenomena of the disease have essentially an hysterical character; there is almost always some derangement of the menstrual function, with certain reflex irritations, and a swollen state of the abdomen.

242. Cases of this kind occur in females of all ages. Dr. O'Ferrall has recorded one in a girl æt. thirteen. I have seen one in another æt. seventeen. Dr. Simpson thinks the complaint as frequent during the first year after marriage as at any other time. I have seen it in a woman who had borne several children, and Dr. Montgomery thinks it most frequent at the climacteric period. From the undoubted fact of unmarried females being liable to the disease, it is clear that its recognition is important, not merely for the purpose of cure, but to avoid the injurious suspicions to which the patient would otherwise be exposed.

243. *Symptoms.*—I have already mentioned that the abdomen is swollen in various degrees, but rarely, I think, to a very extreme degree. It feels firm and elastic, and as a general rule yields a clear resonance on percussion. This is not always the case, however; for in one case I saw, the upper part of the tumor was rather dull, whilst the lower was quite clear, without our being able to explain the difference. The abdomen is generally equably swollen, but protruding more anteriorly. In women who have not borne children the lumbar region bulges, and is resonant, but when the patient has been pregnant, the tumefaction may assume the exact form of the pregnant uterus, as in a case I saw, where it filled the mould, as it were, left by former pregnancies.

The catamenia are generally deranged, scanty, irregular, or, perhaps, altogether suppressed, and as the breasts very commonly sympathize and enlarge, and the stomach exhibits some reflex disorder, we can easily excuse in an ordinary person the suspicion of the existence of pregnancy.

244. Now, if the person be unmarried, and of a questionable character, it is more than probable that in the estimation of her friends, her character will soon cease to be questionable. If she be married, pregnancy will pro-

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[1] Med. Times and Gazette, Sept. 3, 10, and 17, 1859.

bably be taken for granted, and the mistake only detected when labor ought to occur, or when, curious to say, some sort of abortive imitation of labor does take place. The mistake is even more likely to occur in women "of a certain age," as they seem rather easily persuaded of an event so creditable to their virility, and of this nature are probably all the stories current of ladies deceiving themselves and their friends. The difficulty is somewhat increased at this period of life by a not unusual increase of fat giving to the enlargement a more resisting feel and a duller resonance. Having decided in favor of pregnancy, from the assemblage of the foregoing phenomena, the patient finds confirmation strong in certain sensations which she supposes to be fœtal movements, but which, when questioned, she admits are not exactly the same as in former pregnancies. And the difficulty of diagnosis is much increased, as Dr. Simpson has remarked, by a repetition of individual peculiarities which occurred in former pregnancies; as, for example, peculiar discolorations of the skin, or eruptions, or neuralgias, or changes of temper.

Nevertheless it should be remembered that there is generally some irregularity or defect in the sequence, or grouping, or character of these symptoms which distinguishes spurious from true pregnancy when minutely investigated, and it is upon this mainly that our diagnosis will depend.

245. As to the course of the disease, it will vary. The symptoms may disappear after a few weeks or months, or they may continue for about the usual term of pregnancy, and then disappear. Or in some few cases the enlargement and its train of symptoms may go on for twelve or eighteen months, or for some years.

246. *Diagnosis.*—Dr. Simpson has truly observed that "however closely all the ordinary symptoms of real pregnancy may be represented and simulated in the spurious affection, and however minutely even the individual idiosyncracies sometimes seen in the former may be imitated in the latter, there is usually some deviation from the ordinary course of events and some difference in the order and correspondence of the ordinary phenomena, which may serve to put you on your guard, and lead to the discovery of the true state of affairs." The symptoms of early pregnancy may be simulated, but all those of a later period cannot. Suppression of menstruation, sickness of stomach, and increase of the breasts and abdomen, may be present, but they may not have the usual completeness or sequence. Enlargement of the uterus, diminution of its neck, the placental bruit and the sounds of the fœtal heart will not, and their absence at a (supposed) period when they ought to be present, will in competent hands be conclusive.

247. If the abdomen be pressed between the two hands placed at its sides, we can at once detect that there is no such solid body as the gravid uterus present; and if to this we add careful percussion, we shall be satisfied that the distension is neither by solid nor fluid. An examination *per vaginam* will reveal to us the cervix, and as far as we can reach it, the body, of its normal size when unimpregnated; with the usual mobility and with an entire absence of direct shock when the abdomen is lightly struck.

The only difficulty in coming to a conclusion will be when the uterus is coincidently retroverted or enlarged by fibroid or other growths, or in case of an ovarian tumor.

248. Auscultation affords only negative evidence, of course; but in practised hands even this is of great value at a (supposed) advanced period. I need hardly say that on this point we should not trust to one or even two examinations.

249. But perhaps the best aid we have in our diagnosis is in the effects of anæsthetics. Bring the patient fully under the influence of chloroform; carefully and cautiously at first, but completely at last, and we may observe

the abdomen relax in its tension, flatten, and finally subside; thus giving us an opportunity to ascertain the exact condition of the abdominal organs. Wait a little, and as the effect of the chloroform goes off, the abdomen will rise gradually until it attains its previous size.

Taken altogether, the evidence thus obtained will hardly fail to be conclusive.

250. *Pathology.* — There may or may not be any uterine or ovarian disease. Some degree of congestion or erosion is not uncommon; with anteversion or retroversion it may be, but it is clear that these do not form an essential part of the disease. Dr. Simpson thinks that "the aggregate of symptoms which we class under the designation of 'spurious pregnancy' in women, is in some way or other dependent upon the changes which occur in the ovaries and in the uterus at the period of menstruation." I think this very likely, but as yet it is only a brilliant suggestion to be tested by minute investigation.

251. But what is the enlargement? Is it simply a gaseous distension? Apparently not, for in some cases Dr. Simpson introduced a tube into the rectum, and placed the free end in water, whilst the abdomen subsided under the influence of chloroform, but not a bubble of air escaped. He believes that "the phenomenon most probably depends on some affection of the diaphragm, which is thrown into a state of contraction, and pushes the bowels downwards into the abdominal cavity." Although I have no better explanation to give, I confess myself far from satisfied with this.

252. *Treatment.*—There are three things to be borne in mind in the treatment of this affection: 1st, that the general health is more or less disturbed; 2d, that the menstrual function is incomplete; and 3d, that there may be some special local disease. Whatever the latter be, it is of course to be specially treated, and removed if possible, concurrently with which an effort should be made to improve the general health. I have no doubt that if we succeed in restoring the regularity of the catamenia, we shall find that a great step will be gained; but it may be a question whether we should immediately have recourse to emmenagogues. It may be first desirable, as Dr. Simpson advises, to endeavor to allay the irritable condition of the uterus and ovaries; and for this purpose he recommends the bromide and iodide of potassium. Five or six grains of the former may be given three times a day, either alone or with from two to three grains of the iodide of potassium. Or it may be applied locally in the form of a pessary. Further, carbonic acid gas, with or without chloroform, may be thrown into the vagina. Such soothing remedies Dr. Simpson has found very beneficial.

For the nausea and vomiting we may have recourse to any of the remedies usually recommended. Opium, acetate of lead, prussic acid, carbonic acid, ice, creosote, or perchloride of iron or oxalate of cerium, as recommended by Dr. Simpson.

As far as the distension may be due to flatulence, we may seek relief by assafœtida, ox gall, turpentine, the valerianates, powdered charcoal, etc.

The bowels should be kept free by effective but mild purgatives, and the diet bland and nourishing.

CHAPTER IX.

SUPERFŒTATION.

253. The term Superfœtation has been applied to those cases of abnormal conception in which a female already pregnant has been supposed to conceive a second time before the termination of the first gestation. The belief in the possibility of such an occurrence is universal among the older writers, and cases are adduced in support of this view, but modern writers have been more divided in opinion; it is denied by Hebenstreit, Ludwig, Nutger, Schmidtmüller, Blumenbach, Beck, etc.; but admitted by Haller, Hervey, Ploucquet, Barzelotti, Velpeau, Cuming, etc.

254. The cases alluded to are such as the following: — 1. It is not uncommon for women to be delivered of a full-grown child and a blighted ovum at the same time, and from the disparity between them it has been assumed that the period of conception was different for each.

2. Again, a woman may be delivered of two living children at one birth, or within a few hours of each other, one of which may be fully developed, while the other appears immature.

3. Further, the same woman has given birth to twins, of different color, as in the case related by Buffon, and quoted by Foderè and all recent writers on the subject, of a woman at Charleston, South Carolina, who was delivered in 1714 of twins, within a very short time of each other, the one being black, the other white. On examination, the woman confessed that on a certain day, immediately after her husband had left her, a negro entered her room, and by threatening to murder her in case of refusal, obtained connection with her.

Dr. Moseley mentions a similar case: — "A negro woman brought forth two children at a birth, both of a size, one of which was a negro, the other a mulatto. On being interrogated upon the cause of their dissimilitude, she said she perfectly well knew the cause of it, which was, that a white man belonging to the estate came to her hut one morning before she was up, and she suffered his embraces almost instantly after her black husband had quitted her."[1] Cases of the same kind have been published by M. de Bouillon, Drs. Dewees, Trotti, Guerarde, Delmas, Dunglison, etc.

4. Lastly, cases have occurred where the birth of a mature child was succeeded, after the lapse of some months, by the birth of another. Several such cases might be cited. In the Recueil de la Société d'Emulation, there is one of M. A. Bigaud, of Strasburg, aged thirty-seven, who was delivered of a lively child on the 30th of April. The lochia and milk were soon suppressed. On the 17th of September of the same year (*i. e.*, about four and a half months after the first delivery) she brought forth a second apparently mature and healthy child. On the death of the woman the uterus was found to be single.

In the case related by Desgranges, of Lyons, the woman was delivered on the 20th of January, 1780, of a seven months child; and on July 6th, 1780, five months and sixteen days after the former birth, she gave birth to a second, which had apparently reached its full time.

The late Dr. Maton published a similar case in vol iv. of the Trans. of the College of Physicians, London. Mrs. T., an Italian lady, but married to an Englishman, was delivered of a male child at Palermo, November 12, 1807. On the 2d of February, 1808, not quite three calendar months after the preceding accouchement, she was delivered of a second male infant. Dr. Maton assured Dr. Paris that "both the children were born perfect; the first, therefore, could not have been a six-months child." Other cases may be found quoted by Beck, Velpeau, and Cuming, and collected in the elaborate essay of Dr. Alexander Henry.[1]

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[1] On Tropical Diseases, p. 111.

255. Upon the strength of these cases, it is assumed that a second impregnation may be effected, although the uterus be occupied by the results of a previous conception. Our first object is, therefore, to ascertain how far the cases, considered in themselves, warrant such a conclusion, and then whether, if the cases are not otherwise explicable, we are bound to adopt this theory as the true explanation. First, then, I would observe that the first and second class of cases can be easily explained without having recourse to the doctrine of superfœtation at all. When twins are conceived from the one intercourse, it not unfrequently happens that one ovum is blighted, and sometimes rejected, sometimes retained, and occasionally the appearance of the ovum, when subsequently expelled, will be found to correspond to the period of pregnancy at which symptoms of uterine disturbance and threatened abortion appeared. Again, nothing is more common in twin pregnancy than to find one more fully grown than the other, and nothing more easily explained. So that neither of these cases are any support to the doctrine, because they are susceptible of another and more simple explanation.

The third class, where children of different colors are brought forth, is equally unavailable; for, at the utmost, they only prove that a double conception may occur from connection with two individuals, if such intercourse take place with a very short interval. If such cases occurred with an interval of four or five months between the birth of the children, the case would be altered; but I am not aware of any such on record.

It must be confessed that the fourth class of cases is very difficult of explanation, and they are the only ones of any force in support of the theory. It has been supposed, that in such cases both children were begotten at the same moment, but that the tardy birth of the latter was owing to its slower development: but this explanation requires previous proof that a slow growth of the fœtus involves a protracted gestation.

Another explanation has been proposed, based on the fact, that when pregnancy has occurred with a double uterus, one cornu only is occupied by the child. It may in such cases be possible (so it is argued) for the woman to conceive a second time, and the child to occupy the vacant cornu, although the woman were previously pregnant; and in support of this view, a case is adduced which occurred to Mad. Boivin, and which is related in M. Cassan's thesis, On Double Uterus and Superfœtation: "On the 15th of March, 1810, a woman, aged forty, gave birth to a female infant, weighing about four pounds. As the abdomen still remained bulky, Madame Boivin introduced her hand, but could find nothing in the uterus. But the examination led her to suspect that there was another fœtus, either extra-uterine, or contained in a second cavity in the womb. At length on the 12th of May, a second female infant was born, weighing not more than about three pounds, feeble, and scarcely able to respire. The mother assured Madame Boivin that she had no connection with her husband (from whom she had been some time separated), except thrice in two months, viz., on the 15th and 20th of July, 1809, and on the 16th of September following." In this case there can be little doubt of the existence of a double uterus, and it would be difficult to disprove that the second child was not the fruit of the last conception, and, if so, a clear case of superfœtation; but, even granting so much, it only proves the possibility of such an event when the uterus is double, and it would not only be very bad logic to assume that the uterus was double in all cases when two children are born at considerable intervals; but it would be inconsistent with facts, for it is expressly stated that in the case of M. A. Bigaud, already quoted, the uterus was found, after her death, to be single.

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[1] London Med. Journal, 1849, p. 1087.

256. Thus, whilst we need not deny that a double uterus may afford an opportunity for a double conception, at distant periods, we cannot admit one such case as explaining all the cases of that kind on record; and with respect to such, we have made no advance towards an explanation. Admitting this, are we necessarily to adopt the hypothesis of superfœtation? I think not, because the real difficulties of such a theory appear insurmountable; and if so, our ignorance of the true explanation is no argument for the adoption of a false one. The physical difficulties are those which depend on the changes induced by impregnation. The reader will find that it was stated (§ 160) that, shortly after conception, the uterus is lined by the deciduous membrane, a shut sac, closely adherent to the lining membrane of the uterus throughout, and covering the orifices of the os uteri and of the fallopian tubes; that the canal of the cervix uteri is, during pregnancy, plugged with tenacious mucus secreted by the glands. Now if this be the case, and if it be an essential condition of generation (§ 143) that the spermatozoa pass into the uterus, if not through the fallopian tubes to the ovaries, it is evident that the theory of superfœtation involves so much apparent physical impossibility, that it must be rejected, unless it can be shown how the spermatozoa can obtain access to the ovaries when the uterus is (as it were) hermetically closed.

Another view has been latterly put forth by Dr. J. M. Duncan, which, if true, would help us to a solution of the difficulty. He states that the decidua reflexa is not in contact with the decidua vera till after the third month, and that up to that time there may be free communication between the ovary and vagina, and consequent liability to a second impregnation.[1] Additional evidence, however, would be necessary to establish this opinion, and until we possess it, I must honestly confess that I have no better explanation to offer of such cases as Dr. Maton's; but surely it is more philosophical to acknowledge our ignorance, and patiently to wait for additional information, than, in our impatience in a state of uncertainty, to adopt a theory involving such difficulties.

257. In conclusion, I would say, 1. That the theory of superfœtation is *unnecessary* to explain the birth of a mature fœtus and blighted ovum; of a mature and immature fœtus, born together or within a month of each other; or of fœtuses of different colors, as they may reasonably be supposed to be the product of one act of generation, or of two, nearly contemporaneous. 2. That in cases of double uterus, it is possible for a second conception to take place, and (judging from the subsequent birth of the second child, in the only case on record) at a later period than the first. 3. That in the remaining cases, where one mature child succeeded the birth of another after a considerable interval, we have no proof of a double uterus in any, and positive proof that in one case it was single, and that to the explanation of these cases, no theory as yet advanced is adequate; that of superfœtation being opposed by physical difficulties, which are insurmountable in the present state of our knowledge.

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[1] Edin. Monthly Journal, April, 1858.

Notwithstanding this positive assertion of Dr. Churchill, we have on record well-authenticated cases of superfœtation, in which it has been shown that the uterus possessed but a single cavity. Simpson, Duncan, Tyler Smith, and others deny that there is anything to prevent fecundation in the condition of the pregnant uterus, during the early period of gestation. The mucous plug has been shown by Dr. Tyler Smith to be in no respect different, except in quantity, from the mucus which always occupies the cervical canal of the uterus in the unimpregnated state, and through which the spermatozoa make their way in ordinary fecundation. The cervical plug therefore presents no insurmountable impediment to the occurrence of superfœtation. Neither does any obstacle occur to the passage of a second ovum into the cavity of the uterus when already occupied by one; inasmuch as neither of the layers of the decidua in the first month of pregnancy pass over the orifices of the fallopian tubes nor the uterine orifice of the cervical canal. Until the end of the third month the ovum with its envelopes is attached to a small portion only of one of the parietes of the uterus, leaving every other portion of the decidua vera perfectly free for the reception and development of a second ovum. "The infrequency of superfœtation," as well remarked by Dr. Tyler Smith, "probably depends more upon the absence of perfect ovulation during pregnancy than upon any positive mechanical impediment to the ascent of the spermatozoa, or the incapacity of the decidua vera to receive a second ovum."]

CHAPTER X.

EXTRA-UTERINE PREGNANCY.

258. From certain causes, with which we are but partially acquainted, it sometimes happens that the ovum, instead of passing into the fimbriated extremity of the fallopian tube on the bursting of the Graafian vesicle, and being thence transferred into the uterine cavity, in the gradual manner already described, is arrested in some part of its progress, where an effort is made to supply the place of the uterus, and afford space and nutrition for the fœtus. This, however, can only be partially successful, and the fœtus ultimately perishes for want of nourishment. To this misplaced gestation various names have been given — "Extra-uterine pregnancy," "Conceptio vitiosa," "Grossesse contre nature," "Exfœtation," etc., etc.

This abnormal deviation from ordinary gestation was known, but not minutely, to the ancients. Albucasis relates a case of fœtal bones being extracted from an abscess, which had formed near the umbilicus, and similar examples were recorded by Cornac, F. Plater, Cordæus, Horstius, Primrose, Hildanus, Riolan, jun., etc. In more modern times very numerous and well-authenticated cases have been published, and have been carefully collected and referred to by Dr. Campbell in his learned essay on this subject, to which I have been principally indebted for this chapter; and if I need any excuse for the freedom with which I have availed myself of his labors, it may be found in the fact that his assiduity in collecting, and care in referring to the numerous cases on record, as well as the accuracy of his reasoning and the excellence of his practical recommendations, have left little or nothing for me to do but to follow in his steps.

259. All the varieties of extra-uterine pregnancy may be reduced to three: —

1. *Ovarian fœtation*, when the ovum is detained in the ovary; 2. *Tubular fœtation*, when the fallopian tube is the seat of the arrest; and, 3. *Interstitial fœtation*, when the ovum enters the parietes of the uterus, but is detained in an interspace of the fibres before it arrives in the uterine cavity.

Dr. Campbell has added another variety, which he calls the *ovario-tubal*, a compound of the two first, when the sac containing the fœtus is formed by the ovary and fallopian tube jointly. A fifth species, *ventral fœtation*, is enumerated by most authors, where the ovum is found in the abdominal cavity; but I think Dr. Campbell is right in supposing such cases to have originally belonged to one or other variety previously mentioned, and for which a separate section is scarcely necessary.

A brief notice of each variety, with the details of a case or two, will be necessary before considering the symptoms and termination, etc. For reference to cases, I beg to refer the reader to Dr. Campbell's book.

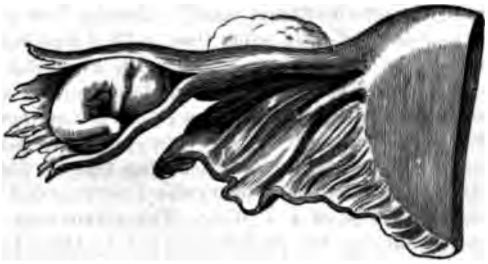
260. 1. OVARIAN FŒTATION. — By some writers the existence of this species of extra-uterine gestation is considered as rather doubtful, on account of the facility afforded for the escape of the ovum after the rupture of the Graafian vesicle, but the evidence of facts is too strong to be resisted.

The earliest example on record is to be found in the Philos. Trans., vol. ii., p. 650, communicated by the Abbé de la Roque. It occurred in 1682: the right ovary was enlarged to the size of a hen's egg, and lacerated through its whole length. The fœtus was found in the abdominal cavity, in the midst of a large quantity of blood.

The following instance I quote from Dr. Campbell; it occurred in the practice of Dr. Granville, and, from his high character, no doubt can be entertained of its accuracy. "The subject of the case was a lady, aged thirty-nine, the mother of seven children. Until Dec. 1818, when she conceived, the catamenia were regular; and from this period till June 9th, 1829, the time of her decease, she experienced various and severe sufferings, and there were occasional discharges of a colorless fluid 'per vaginam.' After death a considerable tumor, soft and movable, was perceived immediately above the pubes, and rather to the left of the linea alba. On reflecting the abdominal parietes, blood to the amount of several pounds was observed to fill every space which the viscera did not occupy. The tumor alluded to was about four times the size of a hen's egg, and displayed the same general black-reddish hue of all the ambient parts. A bloodvessel, the size of a large crow-quill, which penetrated the dense portion of the tumor, was traced upwards to the descending aorta, and was ascertained to be a branch of the left spermatic. A smaller and much shorter vessel arising from the tumor, was also found to communicate with the spermatic vein, thus establishing a complete circulation to and from the parts. The inferior and left half of the tumor presented a surface, consisting at two or three points of diaphanous membranes, through which a fœtus of about four months' growth was readily discovered. The left ovarium was the seat of the tumor, which, as it gradually enlarged, distended the tunics of that organ in the same progressive manner, in a ratio with its own size. As the fœtus, however, increased further, the ovarium burst in three places; and thus the membranous sac forming the tumor partially protruded into the abdominal cavity. During this destructive process, that part of the parietes of the ovarium to which the placenta was attached was also lacerated, so as to tear the adhesion of the mass, thereby producing sudden and fatal hemorrhage The right ovary was sound."

261. 2. Tubal Fœtation. — When the arrest of the progress of the embryo takes place at the fimbriated extremity of the fallopian tube, we frequently find that the ovary forms part of the walls of the cyst in which the fœtus is contained, though it is not always easy to point out the exact locality of the arrest. "In some instances," says Dr. Campbell, "it may be presumed that in the incipient stages of gestation, the ovulum is connected with only one of these appendages, either the ovary or the tube; and that the second organ, whether ovary or tube, becomes involved merely in consequence of its state of activity, its progressive enlargement, and the pressure exerted by the ovum, together with the consequent morbid excitement." Such cases constitute the "ovaria-tubal gestation" of this author, and to this class he conceives to belong those which have been recorded as examples of "ventral-fœtation."

Fig. 80.



Tubal Fœtation.

262. But of all the varieties of extra-uterine gestation, that where the embryo is contained in the tube itself is the most frequent. Riolan published the first well-attested example, and he was followed by Littre, Sanctorinus, Poteau, etc., etc. The following example is taken from the Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol. i. p. 216: "A married woman in her second pregnancy, in consequence of a bilious complaint to which she had formerly been subject, used some remedies she had been wont to employ, and also a warm bath. She had been obstructed but one period, and paid so little attention to this circumstance, that she did not make it known, either to her husband or to the ordinary medical attendant. On May 13th, 1791, the morning subsequent to her having used the bath, she was suddenly seized, without any previous exertion, with a violent pain in the lower part of the abdomen, followed by syncope, from which she soon recovered. A moderate bleeding and an opiate diminished, but did not entirely subdue, the pain, which now attacked the loins as well as the abdomen, and recurred in violent paroxysms, accompanied by vomiting, yawning, and fainting. On the 16th she was somewhat easier; but towards evening there was an aggravation of her sufferings, accompanied by cold sweats, coldness of the lower extremities, interrupted articulation, great restlessness, with want of pulsation at the wrist, and she expired. *Autopsy.* — Nearly a gallon of blood was found effused into the abdominal cavity; a laceration of an inch and a half in length about the middle of the right fallopian tube; an embryo of the sixth or seventh week in the blood; the uterus lined with decidua, and its cavity filled up with gelatinous matter."

I cannot but notice in this place two cases published by Dr. R. Lee,[1] because of the peculiarity of the situation of the membrana decidua:—"A lady died suddenly, in 1829, from internal hemorrhage, produced by rupture of the right fallopian tube, which contained an ovum. On opening the tube, and examining the different parts of the ovum, I found a deciduous membrane everywhere surrounding the chorion, and closely adhering to the inner surface of the tube, as the decidua usually does to the lining membrane of the uterus in ordinary gestation. Within the decidua the chorion, placenta, amnion, and embryo were distinctly seen." Again, "on the 18th of July, 1836, Mrs. K——, after suffering some time with symptoms of inflammation and retroversion of the uterus, was seized with great faintness, and soon expired. A large quantity of fluid blood was found in the abdominal cavity, and the right fallopian tube was extensively lacerated near its fimbriated extremity. On removing the uterus and its appendages from the body, and carefully examining the ovum contained in the right fallopian tube, it was evident that a deciduous membrane everywhere surrounded the chorion, and adhered to the inner surface of the tube. The uterus was considerably enlarged, and its inner surface was coated with a very thick layer of yellowish-white soft substance, like common adipose matter, and bearing no resemblance to the deciduous membrane. There was no trace of any arterial or venous canal in this coating."

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[1] Med. Gazette, vol. xxvi. p. 436.

263. 3. INTERSTITIAL FŒTATION.—This form is the rarest of the three or five; but the following case leaves not a doubt of its existence. It occurred in the practice of the late Mr. Hey, of Leeds, and by him was communicated to Dr. W. Hunter. "The patient, aged thirty-five, of a healthy constitution, was seized, when two months advanced in her second gestation, with pains resembling colic, which were subdued by appropriate remedies; but in the sixth month they returned with much greater violence, and were more diffused than formerly." They were repeatedly alleviated, but as frequently returned. When the term of gestation was completed, the movements of the child ceased. Pains came on, but with little effect, and vomiting, which produced great emaciation, and ultimately proved fatal. "*Dissection* exhibited adhesions between the omentum, intestines, peritoneum, and a large peculiar sac, which occupied nearly the whole abdominal cavity. Besides a well-formed fœtus, free from any mark of decomposition, the cyst, which was a line and a half in thickness, contained a quantity of chocolate-colored fluid, and some purulent-looking matter. The umbilical cord passed from the fœtus through a narrow aperture into a cavity whose walls were an inch and a half in thickness, but of much smaller dimensions than that which contained the fœtus. This smaller cyst, which must have been the uterus, contained a placenta of a size so unusual that it filled three-fourths of the cavity of the organ; both together weighed two pounds and a half avoirdupois. No trace of cicatrix could be detected in the uterine parietes. The membrane of the ovum, after lining the uterine cavity, was reflected to form the inner lining of the cyst which lodged the fœtus."

264. *Causes.*—After the instances I have quoted in illustration of each variety, we may now proceed to inquire as to the causes of extra-uterine gestation, which, however, are by no means easy of discovery. It is possible that either congenital malformation or pathological changes may retain the fecundated germ in the ovary, or prevent its entrance into the fallopian tube, or arrest its progress after its entrance. Narrowness or obliteration of the tube may effect this.

[Velpeau seems to think that occasionally too great density, or preternatural thickness of the covering of the ovule, or envelope of the ovary, may detain the ovum and prevent its entering the fallopian tube at the proper time, and thus become the cause of extra-uterine pregnancy; and likewise various pathological conditions of the tube, as paralysis, spasm, excision, or insufficient length, engorgement, contraction, or inflammation and ulceration of its mucous membrane, etc. Astruc believed that unmarried women were more liable to this accident than others, and it is supposed to be caused by fear or other strong mental emotions. Two striking instances are mentioned by MM. Lallemand and Baudelocque, in which it seemed to be caused by fright. Dr. Rigby very properly observes on this subject, that "it must always remain a matter of great obscurity as to the immediate causes of extra-uterine pregnancy, more especially of the ovarian and ventral species; and the more so as we are still ignorant of the mechanism by which the fimbriated extremity of the fallopian tube grasps the ovary immediately over the impregnated vesicle of De Graef at the moment of conception. In many cases we are inclined to believe that this function of the fallopian tube is destroyed by adhesion between it and the ovary, a circumstance of not uncommon occurrence; but from the alteration in the shape and size of these parts, as also from extensive adhesions which are usually found after death in such cases, it will ever be difficult, and perhaps impossible to prove it."]

In addition, interstitial fœtation has been attributed to narrowness of the uterine orifice of the fallopian tube, or an unusually large interspace between the fibres, or to a partially cornuated uterus.

But these causes, it is evident, are mainly conjectures.

265. *Symptoms.*—The symptoms vary a good deal. So long as the part in which the embryo is lodged can accommodate it, there may be but little disturbance, and nothing to afford grounds for a correct diagnosis. In other cases, the local symptoms resemble those in disease of the uterus or ovaries. In the greater number of cases, there is much suffering from an early period. Certain of the signs of pregnancy may be present, but a degree of irregularity in their intensity will frequently be observed. Thus, the catamenia may be present or absent, and, if present, either scanty or profuse; and not seldom there is hemorrhage, or a discharge of clots, which have been mistaken for portions of the placenta. The mammary sympathies are excited in most cases, and the changes in the areola take place. The patient may or may not suffer from nausea or vomiting, and in some cases at an early period the fœtal movements have been felt by the patient. The increase of the abdomen generally differs from that in ordinary pregnancy, being more to one side, and the pain or uneasiness may be limited to the spot where the tumor is felt. M. Chaussier lays great stress upon a sense of weight and uneasiness, deeply seated in the pelvis, and occasionally extending to the kidneys.

An examination per vaginam reveals a great deviation from the state of the organs in ordinary gestation. The os uteri may be high or depressed, but it is very seldom drawn out or dilated; in fact, it is generally as it was before impregnation, or nearly so.

266. When the cyst in which the ovum is contained bursts, however, a series of new and alarming symptoms are superadded. The patient complains of great uneasiness or pain suddenly occurring, languor, debility, and exhaustion to an extreme degree; there is sometimes a sanguineous discharge from the vagina, with dysuria, tenesmus, irritable stomach, etc.; in short, the patient exhibits the symptoms of collapse from loss of blood.

In tubal fœtation, these symptoms generally come on more suddenly than in the other varieties, so as at once to excite suspicion of a rupture of some internal organ having taken place.

In interstitial fœtation, the symptoms are a modification of those in the other varieties. In some there are abdominal pains and sanguineous discharges, in others these are absent; but in all the cases on record the tumefaction and fœtal movement were confined to one side of the abdomen. It is also remarkable, that in all, the child appears to have lived to the term of utero-gestation.

267. I have already stated that matters may go on more or less quietly for some time, not without injury to the health of the mother, but without danger to her life. However, the crisis must come sooner or later, when the cyst gives way, and symptoms of collapse set in, followed by those of inflammation. This crisis may be hastened by various circumstances, such as violent action of the abdominal muscles, and the consequent pressure upon the tumor, sudden shocks, or blows upon the abdomen, coughing, vomiting, etc. The rupture of the cyst may be followed shortly by fatal results, owing to the shock to the system, the hemorrhage, subsequent inflammation, or from one or more of these consequences combined.

268. But there are many exceptions to such prompt terminations. The patient may survive the shock, hemorrhage, and subsequent inflammation, and the parts may accommodate themselves to the presence of the fœtus, so that the patient shall recover a certain amount of health, and suffer but little local inconvenience; nay, she may even again conceive and bear children; "nine women conceived *once* during the retention of the extra-uterine fœtus; two *twice;* one *three* times; one *four* times; one *six* times; and one *seven* times."

The period during which the fœtus may be retained before the mother's death or its own expulsion varies much. Dr. Campbell gives the following account of seventy-five cases; it was retained "three months in two instances; four months in one; five months in one; nine months in two; fifteen months in three; sixteen months in two; seventeen months in two; eighteen months in seven; one year in five; two years in eight; three years in seven; four years in four; five years in one; six years in two; seven years in three; nine years in one; ten years in three; eleven years in two; thirteen years in one; fourteen years in two; sixteen years in one; twenty-one years in one; twenty-two years in one; twenty-six years in two; twenty-eight years in one; thirty-one years in one; thirty-two years in one; thirty-three years in one; thirty-five years in two; forty-eight years in one; fifty years in one; fifty-two years in one; fifty-five in one; and fifty-six years in one case."

Professor Dyce, of Aberdeen, has favored me with a case in which the fœtus was retained in the abdomen eight years: the patient was twice pregnant afterwards, and delivered of living children, but sunk some months after with hectic symptoms.

These cases afford a striking instance of the power of the human frame to adapt itself to new and apparently adverse circumstances. In many cases, after some time, an effort is made to get rid of the foreign body by artificial openings; thus the fœtus may be passed piecemeal through the abdominal parietes, the colon, rectum, or vagina. In some rare cases, the fœtal bones have made their way into the bladder.

269. Experience alone could have convinced us of the possibility of the fœtus living in these misplaced gestations; yet it may continue to draw nourishment and exist for any period within the full term of gestation. "In ninety-eight cases," says Dr. Campbell, "in which we can decide, or nearly so, on the stage of pregnancy, the fœtus in seventy-nine patients died at the close of nine months, or soon thereafter; one in the eighth; seven about the seventh; one in the sixth; two in the fifth; two in the fourth; five in the third, and one at the end of the first month."

The development during the life of the fœtus appears to proceed at the ordinary ratio, and subject to the laws of normal gestation; the placenta, cord, and membranes are obvious before decomposition takes place; but the placenta is generally thinner than usual. Authors have differed as to whether the ovum receives an additional covering or not, analogous to the decidua; but the evidence adduced by Dr. Campbell and Dr. R. Lee's recent researches seem conclusive in the affirmative; and it is probable that this membrane, which closely resembles the decidua, may perform an office similar in the nutrition of the fœtus. The part to which the placenta is attached receives an increased vascular supply for the occasion.

Almost all writers have described the uterus in these cases as lined with (so-called) deciduous membrane, though in some cases much hypertrophied; but in one of Dr. Lee's cases it was absent, and he doubts whether, when present, it possesses "an organized vascular structure, similar to that of the true decidua."

270. *Treatment.*—If we are satisfied of the nature of the case, the first indication is to prevent or postpone the laceration of the cyst in which the ovum is contained, and which so often proves fatal. With this view, undue exertion of every kind is to be avoided, and all circumstances likely to excite uterine irritation. No pressure should be made upon the tumor, and any uneasiness in it should be allayed as promptly as possible by venesection, leeches, or opium.

When the rupture takes place, marked by the sudden giving way, collapse, and exhaustion, etc., the second indication is to moderate the effusion and support the strength; for which purpose the patient should be placed on a hard bed, with her head low, and the abdomen firmly compressed by a binder, over which cold should be applied, by means of pounded ice in a bladder.

Acetate of lead may be of service, with suitable stimulants and broths.

Should we succeed in relieving the state of collapse, we must next combat the inflammation which will set in, by the abstraction of blood, calomel and opium, blisters, etc.

As the child dies soon after the rupture of the cyst in most cases, we must next endeavor, by quietness and the absence of excitement and irritation, to aid the natural powers in accommodating themselves to the new circumstances of the case. The bowels must be kept free by gentle laxatives, and any renewal of the pain must be met by the application of a few leeches or an anodyne.

If we find after a time that any effort is made to remove the fœtus by the formation of an abscess or fistulous communication and discharge of fœtal bones, it may in some cases be advisable to assist the process by enlarging the opening in the abdominal, vaginal, or rectal parietes; but this should be done with great judgment and care, as serious hemorrhage may ensue, and we are never to forget that nature is generally competent to complete the process she commences.

Any subsequent inflammation must of course be treated in the usual manner.

CHAPTER XI.

PATHOLOGY OF THE FŒTUS.—SIGNS OF ITS DEATH.

271. When describing the contents of the gravid uterus, a short notice of the principal pathological changes to which they are exposed was appended, so that I need not recapitulate them here. They, however, with the diseases to which the fœtus is obnoxious, constitute an important deviation from normal gestation. The latter remain for notice at present.

Abundant observation has proved that the fœtus is liable to almost all the forms of disease which attack the child; that many of them are quite independent of the maternal state; but that, in addition, it may be affected secondarily through the mother. Amongst the examples of the latter, must be classed those cases of premature births which occur during epidemics, and where the fœtus appears to have participated in the disease of the mother, as in the observations of Rœderer, Wägler, Schmurrer, and Russell. I have observed a considerable quickening of the action of the fœtal heart some days after pregnant women have been attacked by fever.

According to Duettel, Schweig, Zurmeyer, etc., children born of mothers suffering under *intermittent fever*, have exhibited the same disease immediately after birth.

Many cases have been recorded by Hildanus, Bartholinus, Möllenbroccius, and, in later times, by Van Swieten, Mead, Baker, Lynn, Jenner, Simpson, etc., of children born with *small-pox*. *Measles* have also been observed in new-born infants by Osiander, Stark, Girtanner, Orfila, etc. Nor are they exempt from other diseases of the skin, as *erythema*, *strophilus*, *pemphigus*, etc.

272. There is scarcely any internal organ which has not been observed to be the seat of inflammation. The presence of *hydrocephalus* is the result of inflammation (acute or chronic) of the arachnoid. Hogween, Veron, and Cruveilhier, have recorded cases of *pleurisy*. Mende and Koelpin have observed *abscesses* of the lungs; Zierhold, *œdema;* and Wrisberg, *scirrhous* induration; Husson, Chaussier, and Billard, have discovered *tubercles;* Cruveilhier, *lobular pneumonia;* and Lobstein, *calcareous deposition* in these organs. Brachet, Chaussier, Dugès, Billard, Carus, Simpson, etc., have observed cases of *peritonitis*; Chaussier, of *enteritis*, etc.

Of the cause of such attacks we know little or nothing.

273. Chronic diseases are even more numerous: the fœtus may suffer from a general *hypertrophy*, or *atrophy;* may be attacked with various forms of *syphilitic disease;* may labor under *worms*, *calculus*, *dropsy*, *jaundice*, or *hernia:* and the pancreas, liver, or kidneys may exhibit organic pathological changes.

The bones and joints are not unfrequently diseased; thus, for instance, children are born with *rickets*, as related by Osiander, Carus, Otto, and others; with *caries*, as observed by Carus and Joerg; or *necrosis*, as in M. Billard's case. Numerous cases of fractures and dislocations of different bones are on record.

274. This brief and imperfect sketch will suffice to prove the truth of the statement made at its commencement, that the fœtus does not enjoy an exemption from disease whilst "in utero;" unfortunately we possess neither the means of detecting nor of curing these affections. The subject is, nevertheless, one of great interest: to enable any of my readers to pursue the investigation further, I shall subjoin the names of some of the authors

who have written expressly upon it: Murat,[1] Osiander,[2] Joerg, Carus,[3] Mende,[4] C. W. Hufeland,[5] Meissner,[6] Hardegg,[7] Billard,[8] Bergk,[9] Zurmeyer,[10] J. Grœtzer,[11] Prof. Simpson.[12] M. Grœtzer's work is an excellent summary of the labors of his predecessors, and Prof. Simpson's Essays are equally admirable for their research, careful observation, and logical deductions.[13]

275. Death of the Fœtus.—But although we may not be able to detect disease in the fœtus, it is often of great importance to ascertain whether it be dead or alive, and is therefore desirable, if possible, to determine what are the *signs of its death*. The question *may* be of consequence to the medical jurist, and *is* always to the obstetrician, as influencing our decision as to the best time for operations.

The diagnosis of a dead fœtus is confessedly very difficult: since the time of Mauriceau the subject has been investigated by many writers, and still, notwithstanding the powerful aid afforded by the stethoscope, many cases are exceedingly doubtful; and for obvious reasons, since most of the symptoms upon which we must rely depend upon the sensations of the mother, and sensations are notoriously delusive.

276. The signs which are given as evidence of the child being dead are: the cessation of its movements; the subsidence or flaccidity of the abdomen; the recession of the umbilicus; the loose feel of the uterine tumor, and its rolling about in the abdomen; a sensation of dead weight and coldness in the abdomen; the breasts suddenly become flaccid, and their secretion suppressed; the health being deteriorated; the appetite bad; the countenance sunk; a dark areola round the eyes; fœtid breath; repeated rigors, etc.

277. Taken separately, none of these signs are certain: the movements of the fœtus may be suspended for some days without its being dead; the degree of tension of the abdomen varies much in the course of pregnancy, especially in women who have had several children; the uterine tumor is occasionally felt as a weight (as it were a foreign body) by women who bring forth the child alive; the coldness is a mere sensation, and therefore of little value, a dead fœtus not being really colder than a living one; and the health may be deteriorated, and a dark shade appear under the eyes, from many causes beside the death of the fœtus. The breasts, however, seldom become flaccid, after having been tense, from any cause but the death of the child.

Besides, it is a matter of common experience, that women retain a dead fœtus "in utero" for weeks or months, and exhibit few or none of these symptoms. In such cases women have even fancied that they felt the fœtal movements up to the time of labor, without any change in the abdomen, breasts, or general health.

278. But although taken singly, none of these signs are conclusive, yet cases occur in which the concurrence of several is nearly so. Suppose, for example, that in the sixth month of pregnancy a patient should find the motions of the child, which up to that period had been lively, cease; and soon after observe that the abdomen and uterine tumor had lost their tense and rounded form, at the same time feeling the latter weighty and rolling loosely in the lower belly, and finding the breasts, which had been tense,

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[1] Dict. des Sciences Méd. Art.: Fœtus.

[2] Handbuch der Entbindungskunst.

[3] Zur Lehre von Schwangerschaft. etc.

[4] Ausführliches Handbuch der gerichtliche Medizin.

[5] Die Krankheiten der Ungebornen, 1827.

[6] Kinderkrankheiten, 1829.

[7] De Morbis Fœtus Humani.

[8] Mal des Enfans nouveaux-nés.

[9] De Morbis Fœtus Humani.

[10] De Morbis Fœtus.

[11] Die Krankheiten des Fœtus, 1837.

[12] Ed. Med. and Surg. Journal, vol. l. p. 39; vol. lii. p. 17. Ed. Monthly Journal of Med., April, 1849.

[13] [An excellent monograph on the subject of fœtal pathology is contained in the "American Journal of Medical Sciences," for August, 1840, and October, 1841; by William Roberts, M. D., of New York.]

firm, and glandular, subside and become flaccid, we should undoubtedly have *almost* proof of the death of the child.

The value of these signs in short consists in their concurrence, and in their contrast to the patient's previous condition and sensations.

279. We have found the value of auscultation in detecting pregnancy by proving the life of the fœtus, and it may very naturally be asked, what evidence does it afford of its death? in other words, as the hearing the pulsations of the fœtal heart proves the child to be alive, does their being inaudible prove that it is dead? I have already stated that in some cases, although the child be alive, yet the sound of its heart is inaudible, or temporarily suspended, and such cases of course prevent a directly affirmative answer to the question. Again, much depends upon the tact and experience of the auscultator; one person may detect a pulsation that is inaudible to another; to pronounce, therefore, that a fœtus is dead because we do not at any *one visit* hear the heart, would be too hasty a conclusion.

But if after hearing the heart pulsating distinctly, we find it gradually or suddenly become inaudible, and continue so, the evidence will be very strong; and if, in addition, the principal symptoms above enumerated be present, there can be little doubt of the death of the fœtus. Dr. Simpson attaches importance to the sudden increased frequency of the fœtal heart as indicative of impending danger, and my own experience would lead me to concur with him, although it may certainly be only temporary.

280. Thus far we have considered the signs of the death of the fœtus, during utero-gestation previous to labor; when this process commences, other and more distinctive evidence is accessible.

On the rupture of the membrane when the fœtus has been some time dead, the liquor amnii is frequently changed, being of a dark color, and of thicker consistence than usual; but if the death be recent, no such alteration will be found.

["The liquor" has been repeatedly seen, not only "thicker than usual," but actually fœtid, although the child was alive and healthy. In such cases, it arises probably from decomposition of a portion of blood which is extravasated by a partial separation of the placenta,—or, perhaps, of a small fragment of the placenta itself.]

Great stress is laid upon the state of the scalp and bones of the cranium, and, I believe, justly. After the fœtus has been dead some time, if the finger be pressed upon the scalp, it is felt to be emphysematous, crepitating under the touch, and a portion of the cuticle will peel off. The bones of the skull also overlap more, and feel loose within the scalp.

When present, these signs are, I believe, conclusive, but the latter only will be found if the death be recent. It is stated by Dr. Parr and others, that no tumor is formed upon the head of dead children; this, however, is only true when the child has been some time dead. I have seen distinct, well-formed tumors on the head of children who had been dead twenty-four hours. The absence of pulsation at the greater fontanelle, and its diminution from the collapse of the bones, is admitted to be an important sign.

281. In *face presentations*, when the child is dead, the lips are flabby, the tongue flaccid and motionless, and the presenting part slightly swelled. In *breech presentations*, the sphincter of a living child resists or contracts upon the finger, but when dead it is relaxed. The discharge of meconium is of no value in breech presentations, and of very little in any other. When the *arm* protrudes, it shortly becomes livid and cold, and the pulse at the wrist often imperceptible, but this does not prove the child to be dead. The peeling of the epidermis is conclusive. In *prolapse of the funis*, the pressure to which it is exposed very soon destroys the child, and in most cases the presence or absence of pulsation in it is a satisfactory test of the life or death of the child. Dr. E. Kennedy, however, records a very instruc-

tive exception to this rule; the cord had been prolapsed for an hour, and during a pain no pulsation was perceptible; when the pain subsided, he "drew the funis backward towards the sacro-iliac symphysis, and then was able to detect a very indistinct and irregular pulsation, which corresponded to a slight fœtal pulsation over the pubis." The forceps were in consequence applied, and the child was saved.

282. Dr. Collins and Dr. E. Kennedy regard the evidence afforded by the stethoscope during labor of the child's life or death as conclusive, or nearly so; certainly the information thus obtained of the changes which occur in the fœtal circulation is extremely valuable, and the gradual diminution in frequency and force of the heart's action, and its ultimate cessation, will justify our belief in the death of the child. It must be remembered that it is not simply the absence of pulsation that is to determine our opinion, but its cessation after having been heard.

CHAPTER XII.

ABORTION.—PREMATURE LABOR.

283. The expulsive action of the uterus may be exerted at any period of gestation, though it appears more easily excited at or previous to the third month, on account of the frailty of the connection between the ovum and uterus. It is also more liable to occur at the time of each month, corresponding to a menstrual period, than during the interval, in accordance with the periodicity peculiar to the female generative system.

If it occur before the sixth month, it is called an *abortion*, subsequent to this period, *premature labor*. It is always an untoward event, and may exert an unfavorable influence upon the health of the female, but it cannot be considered as dangerous, unless it be accompanied by great hemorrhage, and even in such cases it is rarely fatal.

284. Frequency. — Dr. Collins met with at least 393 premature cases in 16,414; Dr. Beatty met with 21 premature cases in 1200. In my own report, 65 cases of abortion are recorded in 1705 deliveries; Madame Lachapelle records 116 cases in 21,960 cases of pregnancy; M. Deubel 35 in 420; making in all 530 premature cases in 41,699 deliveries, or 1 in 78½.

Mr. Whitehead has recently published some statistics of abortion from which I shall give an extract. "Two thousand married women in a state of pregnancy, admitted for treatment at the Manchester Lying-in Hospital, were interrogated in rotation respecting their existing condition and previous history. Their average age at the time of inquiry was a small fraction below 30 years. The sum of their pregnancies, already terminated, was 8681, or 4·38 for each; of which rather less than 1 in 7 had terminated abortively. But as abortion seems somewhat more frequent during the latter than in the first half of the child-bearing period, the real average will, consequently, be rather more than 1 in 7." Of 747, all had aborted once at least, some oftener. "Their average age was 32·08 years. The sum of their pregnancies was 4775, or 6·37; that of their abortions 1222, or 1·63 for each person." From the preceding statements it appears that more than 37 out of every 100 mothers experience abortion before they reach the age of 30 years. As to the pregnancy most likely to be prematurely terminated, Mr. Whitehead states that of 226 women pregnant for the second time, 20 or 8·8 per cent. had aborted of the first, and of 230 pregnant for the third time, 58 or 25·20 had previously aborted. Of 602 cases, abortion occurred at the following periods: in 35 at 2 months, in 275 at 3 months, in 147 at 4 months, in 30 at 5 months, in 32 at 6 months, in 55 at 7 months, and in 28 at 8 months.[1]

285. CAUSES.—The causes of abortion may be either maternal or ovuline.

1. The *maternal* causes may arise from the condition of the mother, or they may be accidental. That certain states of the constitution, or of the general health, render the patient obnoxious to this accident, there can be no doubt; and Denman is probably correct in attributing many cases to this rather than to the specific cause assigned; for as he observes, "that about which the patient was employed, when the first symptom appeared, is fixed upon as the particular cause, though probably she was before in such a state that abortion was inevitable." The habits of life have also a considerable influence, for we find abortion most frequent in the extremes of society.

On the other hand, it is wonderful with what tenacity the ovum is retained by persons of delicate constitution, and under very trying circumstances; thus women far gone in consumption conceive, complete the term of utero-gestation, and are delivered of healthy children. And Mauriceau mentions a case[2] of a woman who fell from a window in the third story of a house, in the seventh month of pregnancy, and broke one of the bones of her fore-arm, dislocated her wrist, and bruised herself very much; yet she fulfilled the period of pregnancy, and was delivered of a living child. Dr. Davis also relates the case of a lady who was thrown from her horse, when three or four months pregnant, and much bruised, yet without interruption to gestation. So that we cannot pronounce *à priori*, that delicate women will abort, although it is undoubtedly a cause far from uncommon.

When this constitutional or local susceptibility is extreme, a very slight shock indeed will be sufficient to cause the accident; thus one lady will miscarry after having a tooth drawn, another from making a false step going down stairs, etc.; and in one case I attended, it seemed to be brought on by the lady's reading an account of a railroad catastrophe, and in another by a hearty laugh.

286. Certain local disorders are said to cause abortion, as leucorrhœa, uterine irritation, a patulous state of the os uteri, diseases of the rectum, bladder, etc.

Mr. Whitehead mentions that of 747 women, the sum of whose abortions amounted to 122, the assigned causes were as follows:—

"Inward weakness," impaired health, and acute disease	911
Accident, mental perturbation, etc.	222
No assignable cause	90

This "inward weakness" to which so many attribute their miscarriages, is, in fact, leucorrhœa, arising from disease of the lower portion of the uterus. Out of 378 cases an examination showed that 275 were thus affected with inflammation and superficial erosion of the cervix, varicose ulceration, œdema, fissured ulceration, induration of the cervix, endo-uteritis, follicular ulceration, syphilitic disease, etc., thus confirming the statement of M. Boys de Loury and Dr. Bennet as to ulceration being a common cause of abortion.

The same consequence may follow febrile complaints; thus a patient will often miscarry during the course of typhus fever, small-pox, scarlatina, measles, etc., but it is possible that the miscarriage in these cases may result from the death of the fœtus, and not directly from the disease. In this way probably it is that syphilis gives rise to abortion or premature labor.

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[1] On Abortion and Sterility, pp. 245–6.

[2] Observation 242.

287. Among the accidental causes of abortion may be enumerated blows, falls, violent concussions, excessive or sudden exertions, straining, severe coughing, etc., which in most cases act by separating partially the ovum from the uterus.

Mental emotions, anger, joy, sorrow, good or bad news suddenly told, may excite the uterus to action, and effect the expulsion of its contents.

Lastly, a female may acquire a habit of aborting. Each occurrence predisposes to a repetition of the accident at about the same period; and after it has happened several times, it is extremely difficult to carry her safely over that period. Thus Dr. Young, of Edinburgh, had a patient who miscarried thirteen times in succession, and Dr. Schultze one to whom the same accident happened twenty-two times at or about the same period of gestation. I was myself consulted by a lady who stated that in less than three years she had miscarried ten or twelve times during the second month of gestation. It is remarkable, that these patients seem to have as great an aptitude for conceiving as for miscarrying.

Dr. Tyler Smith[1] has divided the causes of abortion into excentric, centric, and special, so far as the mother is concerned. The former includes the causes already mentioned, which act by irritation of the mammary, trifacial, vesical and uterine nerves; the second, those which act through the medium of the blood, as scrofula, syphilis, the exanthemata, etc.; and the third includes cases of disease.

288. 2. The *ovuline* causes of miscarriage may be stated generally to be anything which compromises the life of the child, whether the ovum be thereby detached or not. Thus certain pathological conditions of the amnion, chorion, decidua, the erroneous insertion of the funis, diseases of the placenta, especially fatty degeneration,[2] separation of the ovum, etc., must necessarily interfere with the perfect nutrition of the fœtus, and perhaps cause its death and subsequent expulsion. Or the fœtus may die of some of the diseases mentioned in the last chapter. As a rule, it may be stated that the death of the fœtus will be followed by its expulsion, but the period of this occurrence varies very much; a few days only may elapse, or it may be months, or, in a few rare cases, years. I think, also, that the evidence we possess shows the much greater frequency of the ovuline than the maternal causes of abortion; and if so, we must conclude, that as it is better that a blighted fœtus should be thrown off, so abortion in many, if not most instances, is a salutary effort when not complicated.

The occurrence of hemorrhage from internal or external causes is not an unfrequent cause of abortion, partly from the injury done to the fœtus, and partly from the distention and irritation of the uterus. The blood may be effused between the uterus and decidua, between the decidua and chorion, between the chorion and amnion, into the substance of the placenta, or into the cavity of the amnion. It has also been poured into the peritoneal cavity, probably through the fallopian tube, as noticed by Botal, Ruysch, and Smellie.

[It is well ascertained that those females who are subject to membranous dysmenorrhœa are also prone to suffer abortion during the early months of pregnancy. Now Dr. Simpson has shown that the membrane discharged in membranous dysmenorrhœa is, in the same manner as the decidua, the mucous membrane of the uterus itself hypertrophied, and exfoliated, or thrown off at a catamenial period. As regards the decidua Dr. Tyler Smith supposes that there is no great difference between an abortion a few weeks after conception and membranous dysmenorrhœa, except that in abortion the decidua is loaded with the fruit of the womb, and may be discharged more or less in a state of disintegration. According to him every abortion really consists in the throwing off of the mucous membrane of the uterus and the ovum which has been developed upon its surface. Dr. Smith believes that, in many cases of abortion, as in menstruation both of healthy and of morbid type, the disintegration and exfoliation of the developed mucous membrane, or decidua, is the first step in the process, and the direct cause of the loss of the ovum. From this point of view then, we must consider the show in cases of abortion, and the continuous sanguineous discharge, as similar to the discharge in menstruation. In many cases it happens that abortion is threatened, and there is a colored discharge for many days without the loss or injury of the ovum. Abortion does not take place in such cases, probably because the disintegration of the decidua does not occur at the part at which the ovum or the placenta is implanted upon it, or not to a sufficient extent to injure it.

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[1] On Parturition, etc., p. 127.

[2] Dr. Barnes on Fatty Degeneration of the Placenta, Med. Times and Gaz., March 19th, 1853.

In all cases of abortion, Dr. Smith maintains that the developed condition of the mucous membrane, common to the menstrual period and to pregnancy, plays an important part, and is the chief cause of the hemorrhage which then takes place, and in many cases it is also, in all probability, the actual cause of abortion. The tendency of abortion to occur at the catamenial periods has long been a matter of observation. In explanation of this tendency the periodical influence of the ovaria, as well as of the uterine mucous membrane must be taken into consideration.[1]]

289. *Symptoms.*—When threatened with a miscarriage, the patient generally experiences a sense of uneasiness, languor and weariness, with aching or pain in the back; after these preliminary symptoms have lasted for some time, those of labor supervene, and in most cases they do not differ much from those of labor at the full term; the pain may even be as great.

A slight discharge of mucus or blood from the vagina is observed, pains are felt in the back, extending round the loins to the abdomen, and down the thighs, recurring at regular intervals, and increasing in strength and frequency. The stomach frequently becomes irritable, and discharges its contents. The pulse is quickened, the skin hot, voluntary efforts are made in aid of the uterus, and ultimately the contents of the womb, or a portion of them, are expelled.

290. But although these symptoms are generally present, yet the progress of different cases is so dissimilar, that we must enter a little more into detail. 1. Occasionally cases occur where the ovum slips out of the uterus (so to speak) with scarcely any pain, little or no hemorrhage, and followed by a speedy recovery. We see this chiefly in persons who have acquired the habit of aborting. 2. Other patients present the ordinary symptoms of labor, as enumerated above, but which subside after a time, without the expulsion of anything from the uterus, until the expiration of the full term of utero-gestation, when the birth of a full-grown child is accompanied by the expulsion of a blighted fœtus, the case being one of twin conception. 3. Again, the pains of labor may come on with more or less flooding, and after some time the fœtus alone be expelled, the shell of the ovum being retained. The latter is generally detached after a time, or it may be dissolved, and discharged along with the lochia. So long as it remains, hemorrhage is to be feared; and in some cases where it dissolves by putrefaction, irritative fever or uterine phlebitis is excited; such cases, therefore, excite great anxiety, and require careful treatment; although in other cases the shell of the ovum dissolves, and is discharged unconsciously, with no unpleasant symptom whatever. 4. Very alarming hemorrhage may precede or accom-

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[1] [See Manual of Obstetrics, by Tyler Smith, M. D., London, 1858, p. 142, et seq.]

pany abortion. I cannot say that I ever met with a case in which it proved fatal, though I have seen life reduced to the lowest ebb. It is also important to remember that flooding scarcely ever continues after the expulsion of the ovum. 5. There are two very remarkable cases on record by Dr. A. Wood and Dr. Malcolm, in which tetanus supervened upon early abortion, on the eighth and sixteenth day respectively. Both patients died;[1] and other examples have been collected by Dr. Simpson in his essay.[2]

291. The flooding may be caused by external accidental circumstances, such as blows, falls, etc., or it may result from some condition of the ovum or its vessels beyond our cognizance; it may be internal for a time, and afterwards escape, or it may be discharged *per vaginam* from the beginning.

There is of course no difficulty in the diagnosis in the latter case; but it is not always easy to detect internal hemorrhage. In general, the patient becomes pale, exhausted, and faint, with a dark shade under the eyes, and a quick, weak pulse. She complains of headache, lassitude, slight shivering, occasional dull pains in the pelvis, weight about the rectum, perhaps a difficulty in voiding urine, tightness of the epigastrium, etc., with reaction at intervals.

The uterine tumor, if above the pelvis, will be found unusually tense, and larger than the supposed period of pregnancy would warrant. After a time, the distension of the uterus excites contraction, then the membranes give way, and the blood escapes. The fœtus is of course lost. The intensity of the symptoms, and the injury to the mother are in proportion to the amount of the flooding, which, in fact, constitutes the primary danger of an abortion. Generally speaking, the flooding is less the nearer the gestation is to its completion.

292. *Treatment.*—The first question that occurs to us when called in to a case of threatened miscarriage is, whether it *can* be averted. If we possessed any means of ascertaining the state of the ovum and fœtus, the question will probably be, whether it *ought* to be averted; for certainly when the fœtus is dead or seriously injured, it is much better that it should be cast off. But we do not possess this knowledge, and must therefore content ourselves with the conviction, that if the vital relation between the ovum and uterus be compromised, it will be expelled, and in the meantime use the most suitable means to arrest, if possible, the progress of the case, or to avert danger from the mother.

If the hemorrhage be very slight, and the pains very trifling, our efforts may be successful; but if the pains have continued for some time, and are accompanied with bearing down, and especially if there be much flooding, there is little hope of success. In some cases, if the patient be robust and plethoric, it may be advisable to take away blood from the arm; and she should repose on a hard bed, lightly covered with clothes, in a cool room, and be kept in perfect quiet, mental and bodily. All causes of irritation, excitement, or distress, must be removed, and stimulants of every kind avoided. We may then attempt to suspend the uterine action, by means of opium, or some of its preparations, in full doses.

The hemorrhage may be successfully treated, at this stage, as I have repeatedly found, by means of the tincture of Indian hemp (Dublin Pharm.), in doses of five or six drops every two, four, or six hours. Or we may have recourse to the acid mixture, which should be strongly acid, but in which I have not much faith; and applications of cold water to the vulva, or enemata of cold water.

If our attempt thus to arrest miscarriage fail, we must then act according to the circumstances of the case. The most important point is the hemorrhage; for though it may not risk life directly, it may seriously impede recovery, and leave the health much injured. If there be little hemorrhage and the pains increase and expel the ovum, little treatment will be necessary.

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[1] Edin. Monthly Journal, March, 1850.

[2] Ibid., Feb. 1854.

293. If the fœtus alone be expelled, we may wait awhile (if no flooding occurs) to see if the uterine efforts will detach the secundines; if not, perhaps we may be able to reach the lower portion of them with the finger, and gradually withdraw them; if this fail, we may frequently succeed with the ergot of rye.

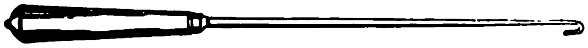
[The use of the ergot of rye under these circumstances is not always without inconvenience; for although it be true that "flooding constitutes the primary danger of abortion," intense pain and nervous excitement are not unfrequent attendants, and ergot never fails to aggravate the sufferings of the patient in these respects. Time, rest, and opium, are the grand remedies in abortion, for which there are no substitutes. Where the strength of the patient and condition of the circulation allow of it, bleeding, in the early stage, if it do not prevent abortion, will rarely fail to mitigate the violence of its attendant circumstances.]

But there are many cases in which none of these plans will succeed. Are we then to leave the case to nature? In many cases we may, but in others we know that after a time the shell of the ovum will putrefy, dissolve, and be discharged; and experience proves that this process sometimes involves considerable danger: danger of hemorrhage first, and afterwards of uterine phlebitis. I shall speak of the treatment in cases of flooding presently; and with regard to the danger of uterine phlebitis from absorption of a putrid ovum, it may be sufficiently imminent to warrant interference. The French recommend a pair of long thin forceps, with which the ovum is to be seized and removed; but against such an instrument there lies the serious objection, that we cannot be certain of not injuring the uterus, unless we introduce the finger also. I have contrived an instrument which I think may be useful when the end of the ovum protrudes from the os. It consists of a steel rod, divided into three claws at one extremity, which expand widely when free. It is enclosed in a small flexible catheter, and when this is pushed towards the termination, it closes the claws; when retracted, the claws open. The ovum may thus be seized without danger of injuring the uterus, and we can use it where it would be difficult or very painful to introduce the hand into the vagina.

The late Mr. Wainwright, of Liverpool, published a short paper in one of the journals, in which he recommended extraction of the ovum by introducing the hand into the vagina, and one, or at most two, fingers into the uterus. That this is practicable, and in certain cases advisable, I know by experience, having repeatedly practised it; but it must be remembered that it is not free from danger, and before we have recourse to it we should be satisfied that the natural powers will not act, even under the influence of ergot. Further, if done at all, it should be before the secundings have putrefied, or irritative fever set in.

[Dr. Rigby advises the mode recommended by Levret as preferable to the employment of the fingers, viz., to throw up "a powerful stream of warm water by means of a syringe." Dr. Dewees employed a wire crotchet for the removal of the secundines when they were not thrown off spontaneously, or by the use of ergot. This instrument "consists of a piece of steel of the thickness of a small quill at its handle and gradually tapered off to its

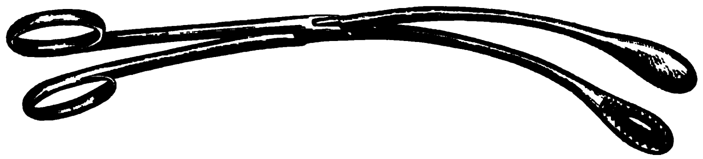
Fig. 81.



Dewees' Wire Crotchet.

other extremity, which is bent to a hook of small size." In the accompanying drawing (fig. 81), the instrument is represented of one-third the proper size. Various other contrivances to effect the same object have been proposed at different times; the best, because the safest and most efficient, in my estimation, is the "*placental forceps*" of Dr. Henry Bond of this city.

Fig. 82.



Bond's Placental Forceps.

This instrument is well represented in the accompanying drawing (fig. 82). "It is about ten inches long, curved laterally on a radius of about twelve inches, and the blades are about one inch and a half longer than the handles. The blades terminate in an oval expansion nearly half an inch wide. The handles and blades, including the edges of the oval expansion, are rounded or bevelled off, so as to preclude all probability of wounding or pinching any of the surrounding soft parts. The inner part of the oval expansion is made concave and rough, so as to maintain a secure grip upon the body embraced. The curvature is intended to be such, that when introduced with the finger as a director, in cases where the perineum is rigid, there shall be no unnecessary or inconvenient pressure on this part, or on the urethra. The outside of the oval part of the blades is made slightly convex and smooth, without a fenestra, so that in passing them through the os uteri, and expanding them so as to embrace the placenta, there shall be the least danger of abrading or lacerating that part."[1]]

294. Thus far I have spoken of the treatment of the simpler forms of abortion; let us now proceed to consider those cases which are complicated with flooding. When it is considerable, there is little or no chance of preventing miscarriage, and as the danger from hemorrhage ceases with the expulsion of the ovum, our endeavors must be directed to moderate the discharge, until that event take place. The most direct means of restraint we possess is *the plug;* but this must never be used, if internal hemorrhage *can* take place to such an extent as to destroy life: in other words, not if the uterus be empty, and the patient far advanced in pregnancy. If the uterus be filled with its natural contents, or be only slightly distensible, even though empty, we can restrict the amount of loss by filling the vagina, and stopping the external outlet. For this purpose Dewees recommends a sponge, others a silk handkerchief, or tow; but I have found cotton wool by far the best, and most easily introduced through a speculum. The vagina must be filled completely, and after six or eight hours the plug should be withdrawn, and, if necessary, a fresh one introduced.

[It should be kept constantly in mind that, whenever there is the least prospect of saving the fœtus, the plug is inadmissible; for the blood being prevented by it from flowing out of the uterus, will be liable to penetrate between the internal surface of the latter and the ovum, and thus increase its detachment. At the same time, the tendency of the uterus to contract and expel its contents, is increased by the presence of the plug, and the coagulum of blood within its cavity.]

Cold should be applied to the vulva, by means of a cloth dipped in cold water and suddenly applied: it may be removed after the shock is produced, and reapplied at intervals. I have also seen great benefit from enemata of cold water. Opium in small doses is very useful, nor does it suspend the uterine contractions; and the tincture of Indian hemp, as before recommended. Drs. Dewees and Conquest recommend the acetate of lead; and others, large doses of dilute sulphuric acid in infusion of roses, Gallic acid, tannin, or Ruspini's styptic; but I cannot say that I have obtained much benefit from them.

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[1] [Amer. Journ. of the Med. Sci., April, 1844.]

295. When the plug is removed, we should carefully examine the os uteri, so as to ascertain if the ovum is descending; if we are able to reach the lower end of it, it is often possible, by a little dexterity, to hook it down. If it be beyond our reach, we may replace the plug, and give ergot to excite the uterus to action. Borax is highly esteemed in Germany, and has been recommended by Dr. Copland, for its influence in exciting uterine contraction; it may either be given alone or combined with the ergot. After the ovum is removed, it will be well to have the vagina syringed twice a-day with tepid water. It soothes the parts, and removes any putrefying blood or irritating discharge. But supposing that although by these means the hemorrhage be arrested, yet that the ovum is retained without any evidence of irritative fever, are we to interfere for its removal? I think not. In such cases, I give half drachm doses of ergot occasionally, watch the patient carefully, plug when necessary and wait. After the lapse of days or perhaps weeks, the ovum may be expelled in one or several masses, or a change in the amount and character of the discharge will warrant us in concluding that the ovum is dissolving and coming away. Longer experience has made me less fearful of leaving these cases to nature, and more unwilling to interfere hastily.

296. In the majority of cases, the natural efforts, or the means just recommended, will succeed in expelling the ovum; but in some they fail, and the patient may be reduced to the verge of death by the flooding, which is kept up by the presence of the ovum. In such cases a more direct interference has been recommended. M. Levret advises warm-water injections into the vagina and uterus; Dr. Dewees, the use of a wire crotchet;[1] and some French writers (as already mentioned), the use of a delicate pair of forceps. The use of any instruments of this kind will require great care, and can only be safe so far as their application can be regulated by the finger. In many cases, where the parts are dilatable, two or more fingers may be easily introduced, and the ovum extracted, or the hand may be introduced into the vagina, and the ovum swept out of the uterus by one finger. I have several times had occasion to perform this operation in extreme cases, and I have been able to do so with perfect success, as far as the extraction of the ovum is concerned, and without any unpleasant consequences.

But let me be quite understood by my junior readers; such an operation at an early period of gestation is not without danger, and requires delicacy, gentleness, and tact: to have recourse to it in any but extreme cases would be unpardonable rashness; but I should deem it just as wrong to allow a patient to die of hemorrhage without having had recourse to it.

297. The *after-treatment* of patients who have miscarried requires great care. The popular belief is, that abortion is more dangerous than labor, and I am not sure that it is far wrong. No doubt exists that women are as liable to puerperal disease after abortion or premature labor as after delivery at the full time, and they require a more careful management than is generally adopted by them.

The patient should rest in bed the usual time, and then return gradually to her usual occupations. Attention should be paid to the lochia, that they be not checked, and to the bowels. The diet for some days should be bland and unstimulating.

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[1] [Dr. Dewees, it is believed, never employed the "wire crotchet" for the removal of the ovum, but solely to bring away the *secundines* after the rupture of the ovum, and the escape of the fœtus.]

298. The *prophylactic treatment* of abortion or premature labor requires, in the first place, the removal or avoidance of all possible causes; and secondly, the adoption of all means calculated to strengthen the constitution.

The state of the stomach and bowels must be carefully regulated, the diet be light and nutritious, and exercise taken in the open air, but not so as to occasion fatigue. If the patient be robust, the pulse full and quick, and some threatening symptoms present, a small bleeding may sometimes be useful; but if she be weak and cachectic, we must have recourse to tonics.

If the patient have previously miscarried, as she approaches again the same period, she must take absolute rest, lying on a sofa or bed, lightly covered, the greater part of the day, until the period be passed. Rest, more or less absolute, is one of the most powerful prophylactic means we possess, and in all such cases sexual intercourse should be prohibited from the period pregnancy is suspected, until after quickening.

Cold sponging, the use of the "*bidet*," or cold bathing as recommended by Mr. White, of Manchester, is highly beneficial, provided we guard against too great a shock. In some cases I have seen a beneficial effect produced by daily syringing of the vagina with cold or nearly cold water, at the time of using the bidet or hip-bath.

["In the management of cases of threatened abortion," says Dr. Lever,[1] "it is my rule, if possible, to get a thorough knowledge of the immediate or exciting cause of the hemorrhage or pain, or both; secondly, before using opium, to ascertain the state of the os uteri, and especially whether the anterior part of the neck has lost its plumpness and firmness, and has become soft and baggy. If with the discharge we have a patent state of the os uteri, and if the neck be soft and loose, the exhibition of opium will do harm, by retarding the emptying of the uterus, which must sooner or later take place. But while I do not advocate the use of this drug under the circumstances related, I can speak loudly in its praise after the abortion has occurred, especially if such have been attended with a large loss of blood; it will then allay excitement, tranquillize the circulation, and procure sleep. These remarks, however, do not altogether apply to those cases which menace from accident, or from mental causes, or those which may be said to be due to habit. In these, with the application of cold, perfect quietude, and unstimulating diet, I have known the exhibition of opium by the mouth, or, what I prefer, a cold starch injection with opium, thrown into the bowels, and repeated every night, or more often according to existing circumstances, followed by the best results."]

When the habit of miscarrying has been acquired, one of the most effective means of breaking it, is to give the uterus a long rest, by separating the woman and her husband for several months.

[This habit is sometimes so firmly fixed as to be very difficult to overcome. Dr. Huston states, in a note to a former edition, that he has succeeded in some very obstinate cases by confining the patient to a sofa, commencing some time before the usual period of miscarriage and continuing several weeks after the time had gone by—carefully avoiding the erect position and all unnecessary muscular exertion, and using at the same time injections daily of opium, in sufficient doses to prevent uterine action—the quantity varying from two to five grains in the state of powder, suspended in mucilage. By these means a condition of tolerance on the part of the uterus may be acquired, which will allow gestation to go to the full period.]

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[1] [Lond. Med. Gaz., 1849.]

PART III.

PHYSIOLOGY OF THE UTERUS. PARTURITION.

CHAPTER I.

CLASSIFICATION.—DEFINITIONS, ETC.

299. We have now arrived at the last great function of the uterine system—that of **Parturition**, with its abnormal variations.

It consists in the expulsion of the fœtus and its appendages from the cavity of the uterus, and ends in the separation of the child and the mother.

It occurs, as we have seen already, at the end of nine calender months and a week — ten lunar months — forty weeks — or 280 days, a few days being allowed either way.

300. The magnitude and importance of the event, and the regularity with which it takes place, have induced physiologists of all ages to assign causes for it, but as yet without success.

Thus it has been supposed that the uterine action is excited by the struggles of the fœtus for want of adequate nourishment, or from the constraint of its position, or from the endeavor to breathe; by others it has been attributed to the acrid nature of the liquor amnii. Buffon has likened the process to the dropping of ripe fruit. Hervey, Burdach, and others attribute it to the uterus having attained its maximum of irritability at the exact time that the fœtal development is complete. It would be easy to fill pages with similar explanations, but these may suffice: they are all either more elaborate expressions of the fact, or mere hypotheses.

301. But though all search has hitherto failed in discovering the exciting cause of labor, it has established the fact, that the periodicity which we found to characterize the other uterine functions prevails here also. For example, abortion or premature labor, when not the result of external accidental causes, occurs very generally at a monthly — or what, but for conception, would have been a menstrual period.

Again, as remarked by Stark and others, the normal period for parturition corresponds to a menstrual period: on this principle Klugè calculates the duration of pregnancy in every case at 280 days, and so much more or less, as impregnation took place immediately before or after menstruation. Speaking generally, labor may be looked for at about the tenth period after the last appearance of the catamenia.

Lastly, in extra-uterine gestation, an attempt at labor occurs very generally at the same period.

So that, taking the monthly discharge as the type of utero-ovarian peri-

Author.	Total No. of Cases.	Head presentations.	Breech presentations.	Inferior extremities.	Superior extremities.
Mad. Boivin. . . .	20,517	9,810	372	238	80
Mad. Lachapelle. .	15,652	14,677	849	255	68
Dr. Jos. Clarke. .	10,387	9,748	61	184	48
Dr. Merriman . . .	2,947	2,735	78	40	19
Dr. Granville . . .	640	619	2	8	1
Edin. Hospital. . .	2,452	2,225	17	8	4
Dr. Maunsell . . .	839	786	. .	21	4
Mr. Gregory	691	645	14	7	4
Dr. Collins.	16,414	15,912	242	187	40
Dr. Beatty	1,182	1,105	28	15	4
Mr. Lever	4,666	4,266	59	29	12
Dr. Churchill. . . .	1,640	1,119	85	22	9
Drs. M'Clintock and Hardy....	6,634	5,815	140	61	26
Drs. Sinclair and and Johnston.	18,748	11,874	309	181	60

305. The *diagnosis* of different presentations may be thus generally stated. The *head* may be known by its hardness, by the sutures and fontanelles.

The *breech*, by its softness, by the cleft between the buttocks, the anus, os coccygis, scrotum or vulva.

The *knee*, by its rounded form, by the condyles of the femur.

The *foot*, by its long form, its being at right angles with the leg, the nearly equal length of the toes, the narrow heel, etc.

The *elbow*, by the olecranon process rendering the joint sharper than the knee.

The *hand*, by its shortness, the unequal length of the fingers, and the divarication of the thumb.

306. POSITIONS. — The position is the relation which some part of the presentation bears to a given part of the pelvis; thus the positions of the head are determined by the relation of the fontanelles to the foramen ovale and sacro-iliac synchondroses; or, in more general terms, the position may be said to be the relation of the extreme points of certain diameters of the child to the extreme points of the pelvic diameters. These we shall examine in detail in the next chapter.

307. STAGES OF LABOR.—For the convenience of description, it has been the practice to divide the process of labor into so many parts or stages, some making three, others four, five, or six: I shall content myself with three; the first extending from the commencement of labor to the passage of the head through the os uteri, the second terminated by the birth of the child, and the third occupied by the expulsion of the placenta.

CHAPTER II.

MECHANISM OF PARTURITION.

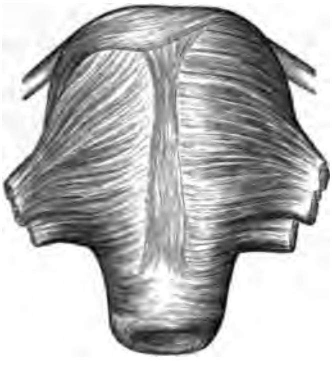
308. **Before** describing the phenomena of natural labor, it will be better to investigate the mechanism by which the expulsion of the child is effected, and with this view we shall first examine the elementary agents of parturition, separately, and afterwards their joint action. These primary conditions, or agents, are, 1, the expulsive force; 2, the passages; and 3, the child.

309. 1. The Expulsive Force.—The uterus is in all cases the main agent in the expulsion of the fœtus, and in some, the sole power employed; as, for instance, when the death of the mother precedes the birth of the child; or when the mother is delivered in a state of syncope or asphyxia, as related by Haller and Heńke; or in cases of prolapsus uteri, as mentioned by Wimmer, Chopart, etc.

We have heretofore seen that the uterus, if not muscular, possesses at least the character of muscularity, that it is composed of regular and irregular layers of fibres; at the time of labor these fibres contract, become shorter and thicker, and by their joint action diminish the size of the uterine cavity. The contractions are periodical, with distinct intervals, and each one is called "*a pain.*" They were so named, no doubt, from the suffering they occasion, but, in obstetric language, the term "pains" refers to the uterine action, and not to the suffering.

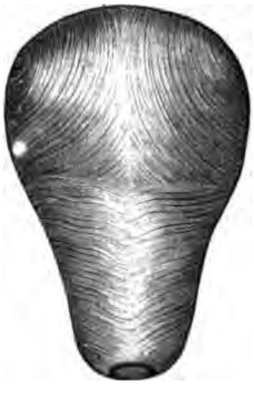
[The annexed cuts will exhibit the arrangement of the muscular fibres of the uterus according to Madame Boivin, M. Doville and other authorities.]

[Fig. 83.]



External Layer of Uterine Muscular Fibres.

[Fig. 84.]



Internal Layer of Uterine Muscular Fibres.

The contractions commence in the cervix, according to Müller, Michaelis, and Wigand, and there is reason to believe, some time previous to the beginning of real labor, and without suffering; for in most cases, at the commencement of labor, we find a slight degree of dilatation of the os uteri, without any complaint on the part of the patient. After this unconscious uterine action has continued for a time, it is attended with pain, which marks the commencement of labor. The suffering increases with the increase of the pains. They are seated at first in the loins, and gradually extend round to the abdomen and down the thighs. From their acute, stinging character, these pains, which are limited to the first stage, are called "cutting or grinding pains:" during the second stage, the suffering is less acute, though not less severe, and the uterine contractions being aided by voluntary efforts, the pains are called "forcing or bearing-down pains." The former occasion the patient to cry out, but the outcries are suppressed during the second stage, from the necessity of holding the breath, to fix the chest as a "*point d'appui.*" The cause of the suffering is, first, the forcible distension of the cervix, next, the pressure of the fibres during contraction upon the nervous filaments, and, lastly, the dilatation of the passages. The amount of suffering depends a good deal upon the temperament of the patient, and upon her habits of life; among savages it appears slight, but it is excessive in civilized life.

310. Each uterine contraction has a peculiar character; slight at first, it gradually increases until it arrives at its maximum of force, remains stationary for a short time, and then quickly subsides: and this is characteristic of the entire labor; for the pains which are slight at first, go on increasing in frequency and force, until, having arrived at the maximum degree of power, all obstacles yield before them, and delivery is accomplished.

Another remarkable peculiarity is their periodicity; each pain is followed by a distinct interval of rest and ease, diminishing as the labor advances, but in a regular manner. M. Saccombe has given an exact record of the frequency and duration of the pains, in one case, which I shall extract.[1] Between 10 and 11 o'clock, A. M., the patient had seven pains, and from 11 A. M. to mid-day eleven pains, as follows:—

						Minutes.		Seconds.
From the	1st	pain	to the	2d	the interval	was 15	and its duration	21
	2	"		3	"	14	"	27
	3	"		4	"	10	"	27
	4	"		5	"	8	"	29
	5	"		6	"	7	"	32
	6	"		7	"	6	"	35
	7	"		8	"	6	"	36
	8	"		9	"	6	"	40
	9	"		10	"	6	"	42
	10	"		11	"	5	"	45
	11	"		12	"	6	"	45
	12	"		13	"	5	"	47
	13	"		14	"	5	"	49
	14	"		15	"	5	"	55
	15	"		16	"	4	"	1′ 2
	16	"		17	"	4	"	1′10
	17	"		18	"	4	"	1′27
	18	"		19	"	4	"	1′33

At this period the waters escaped, and the head was soon expelled. M. Saccombe remarks that, "it results from this observation:—1. That the interval between the pains is in inverse ratio to their duration. 2. That the duration of each pain is in direct ratio to its intensity; that is to say, in proportion as the interval between the pains gradually diminishes, so does their duration increase, and in proportion as their duration increases, so does their intensity." The same conclusions equally apply to the severer pains of the second stage.

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[1] Elémens de la Science des Accouchemens, p. 202.

311. The pains, as I have already said, commence in the cervix, and gradually involve both the body and fundus; their first effect, as Wigand has observed, being to elevate, as it were, the presenting part, and afterwards to force it down. During a pain, the uterus becomes hard, round, and prominent, with the fundus tilted forwards; when the pain subsides, it softens, but does not quite recover its former flaccidity.

It is impossible to estimate exactly the amount of force exerted by the uterus; it is always in proportion to the resistance, although the mode in which it is exerted varies; in some cases, it overcomes the obstacles by rapid and energetic pains, in other cases, the same end is attained by a longer and slower process.

The first stage of labor is completed by the uterine action alone, but during the second stage it is aided by the voluntary muscles, especially those of the abdomen, which press directly upon the uterus, and by the depression of the diaphragm, which diminishes the cavity of the abdomen. The additional effort made during the second stage is owing to the increased amount of resistance to be overcome.

Towards the termination of labor, expulsive efforts are made by the vagina, and these are still more evident in the extrusion of the placenta.

312. Uterine action is not directly subject to the control of the will, although mental emotions exert a considerable influence upon it. For instance, labor may be brought on by mental excitement; and, on the other hand, anger, fear, surprise, etc., may suspend the pains. Betschler relates a case where the labor was arrested by the fright occasioned by a violent storm, and many of my readers are familiar with the case related by Baudelocque, in which the pains ceased each time that the pupils who were to witness the case came in sight of the patient. A temporary suspension of labor on the arrival of the accoucheur (especially if sudden and unexpected), is a very common occurrence.

I have spoken of the voluntary exertions made during the second stage of labor: these, it is true, are at first under the command of the will, but at a more advanced period it is scarcely possible for the patient to withhold the co-operation of these muscles.

Dr. Tyler Smith thus sums up the motor actions of the uterus: "Volition may be said to affect the process only indirectly. Emotion has a direct influence, but it is accessory rather than essential to its performance. Reflex action is the great physiological power, which being absent, the function of parturition could not be properly performed. Peristaltic, or immediate action, is the basis or radical element upon which the other causes of motor action operate."[1]

313. 2. THE PASSAGES. — Let me recall in a few words to the reader's recollection the diameters of the pelvis: those of *the brim* being — the antero-posterior, 4 to 4½ inches, the transverse, 5¼ inches, and the oblique, 4¾ to 5 inches; the relative proportion of these gradually changes in the *cavity*, until at the *lower outlet* the transverse is 4 inches, and the antero-posterior 5; in other words, that which was the longer at the upper outlet, is the shorter at the lower. From these diameters, a deduction of a quarter of an inch in the antero-posterior, and half an inch in the transverse diameters, must be made, on account of the soft tissues clothing the pelvis.

I also remarked before, the great changes in the axes of the pelvis, which form an obtuse angle with each other, that of the brim looking upwards and forwards, and that of the outlet downwards and forwards. Lastly, I pointed out, as an important mechanical agency, the inclined planes of the cavity of the pelvis, the direction of which is downwards and forwards.

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[1] Parturition and Obstetrics, p. 48.

[As no correct idea of the mechanism of labor can be acquired unless attention is paid to the several planes of the pelvis, and the variations produced in the direction of these planes by changes in the position of the body, and by disease, we have taken the liberty to introduce here an extract from Dr. Meigs' "Obstetrics—the Science and the Art," which, with the accompanying illustrations, places this subject in a very clear light.

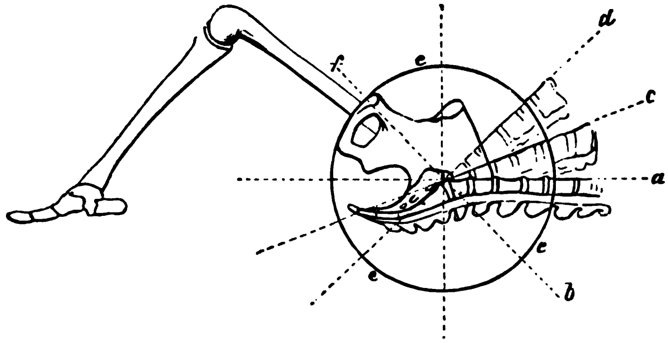
"PLANE OF THE SUPERIOR STRAIT.—The plane of the strait is an imaginary superficies, the anterior margin of which is at the symphysis pubis, its posterior margin at the promontory, while the rest of its margin touches the inner lips of the linea iliopectinea.

"When the woman stands erect, or lies at length on the back, the plane of this strait dips at an angle of 50° to the axis of her body.

"INCLINATION OF THE PLANE.—It must clearly appear that the plane of the superior strait dips at a variable angle in various positions of the trunk of the body; for if the subject be standing, it dips as above at 50°, but if the trunk be inclined forwards, the dip will be lessened; or if the trunk be inclined far backwards, it may be increased. Now this is an important item of obstetric knowledge, since upon it is founded advice as to the decubitus of the patient, whom we may direct to extend her trunk or to flex it more or less, as we may desire to bring the plane of the superior strait into a position that may favor both the entrance of the presenting part into the strait, and its passage through it.

"The figure is designed to show that the plane of the strait may give different angles with the spine, according as the spine is brought more forward, or carried further backwards over the opening. Thus *e e e* is a circle of which the diameter *b f* represents the inclination of the plane of the upper strait, equal to an angle of 135° *f a*, which is the ordinary altitude of the spinal column or axis of the trunk. If the patient lying upon her back should have her shoulders raised, so as to carry the spine forward to *c*, equal to 22·30°, the angle would be reduced to 112·30°. But if the shoulders should be still more elevated to *d*, the axis of the trunk would be at right angles to the plane of the strait *b f*.

Fig. 85.



Planes of the Pelvis.

"The same effect as to the inclination of the plane of the strait is produced in the patient, lying on her side, whenever she bends her head and trunk forwards; and, indeed, in labors, we see women constantly prompted by an instinctive sense of the utility of it, bending the trunk quite over the abdominal strait, to which, moreover, the old nurses and experienced crones urgently exhort them. A child's head, that in one inclination of the plane should be driven against the symphysis pubis, would with a lesser inclination of it plunge at once to the bottom of the pelvis.

"Justus Heinrich Wigand, the lamented author of the celebrated volume entitled *Die Geburt des Menschen*, was deeply impressed with the importance of a careful attention to the inclination of the plane in labors. He often made use of his knowledge of it as a foundation of his prognosis. I have copied these outline figures from the second edition of his work, by Froriep. They represent the female torso in profile. Each figure has marked upon it six lines, of which the two horizontal ones extend parallel to each other, from the promontory of the sacrum and the symphysis pubis respectively.

"In a well-formed pregnant female, the profile will resemble the outline figure, provided the child be not very large, nor the liquor of the amnios excessive in quantity. As in fig. 86, the back bone will not be excessively curved. A line drawn horizontally forwards from the top of the sacrum will pass out at the navel, and equal angles will be formed by a line drawn from the top of the sacrum to the symphysis pubis, which indicates the inclination of the superior strait, and one drawn from the same point to the scrobiculus cordis. A line from the scrobiculus cordis to the symphysis pubis, will be perpendicular to the one first mentioned.

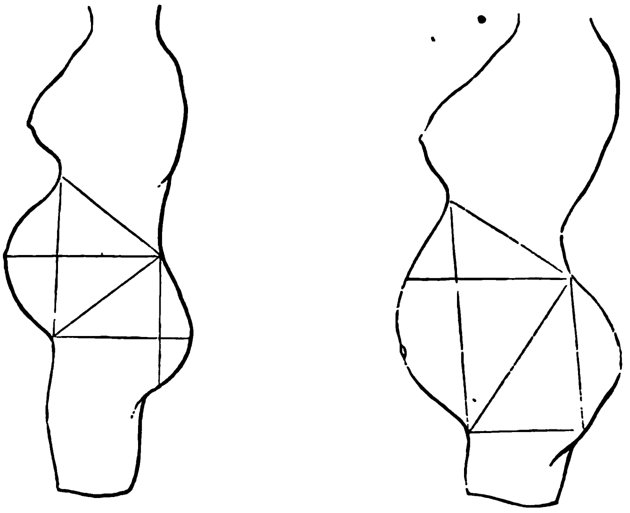


Fig. 86. Fig. 87.

Planes of the Pelvis.

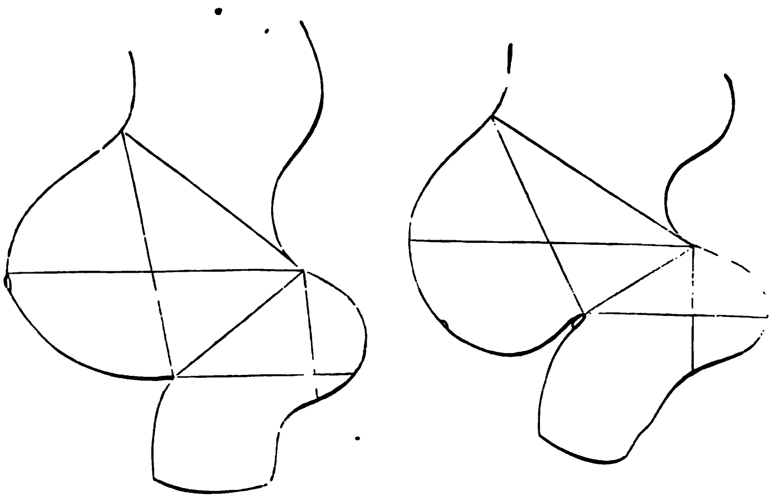
"Inspection of such a figure might well serve to establish a favorable prognosis; since, cæteris paribus, any untoward circumstances would be very little to be expected with so perfect a form, proportion, and arrangement of parts.

"Figure 87 is a copy of Wigand's figure 3d, in which he proposed to represent the profile of a pregnant woman of apparently perfect form, but the inclination of whose superior strait is excessive, as may be seen by observing the line drawn from the top of the sacrum to the top of the symphysis pubis. In such a patient the plane of the strait looks almost backwards, and the indication of *Conduct* would be to cause her to bend her body strongly forwards, flexing her thighs very much upon the pelvis. Such a direction alone might suffice to correct the excessive inclination of the plane, whereas, if she should lie on the back with the shoulders low, and the limbs extended, the presenting part could hardly fail to be driven upon the top of the ossa pubis. In this figure the back is much more curved than in the former one. The horizontal line, from the base of the sacrum to the symphysis, rises far above the navel, and the upper triangle or that of the scrobicle is much smaller than that of the pubis. The line falling from the scrobicle to the pubis retires, whereas in the former figure it is perpendicular. In this figure the perpendicular line from the base of the sacrum is far in advance of the upper dorsal vertebræ.

"The contemplation of these ingenious profiles of the admirable German cannot fail to increase the tact and knowledge of the student, to whom the study of them is warmly recommended.

"Here is Wigand's fig. 4 (fig. 88), in which is the profile of a woman with a pelvis so deformed as to imply a necessity for the operation of perforation, on account of its vitiated conjugate diameter. The angle formed by the back part of the sacrum and spinal column is much too small. The bend is quite different from the gentle curve seen in the first profile. The scrobicle projects very much over the symphysis pubis, as by the line uniting them may be seen. The horizontal line from the base of the sacrum comes out just above the navel. The line from the scrobicle to the base of the sacrum, and that from the sacrum to the pubis are not equal — as in the first and more perfect figure. The chord line from the promontory to the coccyx retires, and the whole of it is in rear of the upper part of the spinal column.

Fig. 88. Fig. 89.



Deformed Pelvis.

"Wigand's 5th figure (fig. 89) represents a pregnant woman, the conjugate diameter of whose superior strait does not exceed one inch or one inch and a half; and which, according to most of the German accoucheurs, indicates a resort to the Cæsarian operation.

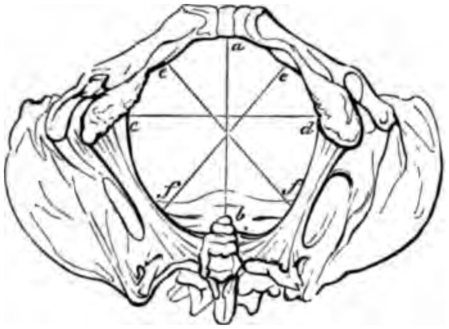
"The belly is quite pendulous over the pudenda. The plane of the strait makes a very sharp angle with the horizontal line which comes out high above the umbilicus. The back is extremely hollow, in consequence of the sinking of the sacral promontory down towards the pubis, and the line from the scrobiculus cordis to the ossa pubis retreats strongly in a backward direction, leaving the breast to hang far over the pudenda in front. The curve of the sacrum is sharp, and the compensating curvature of the upper part of the vertebral column is highly characteristic of this malformed pelvis, and is an evil omen to the unfortunate woman.

"Such are some of Wigand's outline figures. I believe that the study of them will be very useful to the student. It takes many years of practice, and a great clinical experience and close observation like Wigand's, to enable one to become possessed, at a glance, of the peculiarities of the case. He, however, was a *Master* in our art, a man who devoted his time to its improvement, and spent the last moments of his truly missionary life in laboring to complete the beautiful volume from which I have taken his drawings. It is a privilege and an honor to evoke such a man from his too early grave, in order that he, though dead, may yet speak in this distant land.

"PLANE OF THE INFERIOR STRAIT. — The plane of the inferior strait is usually regarded as bounded by the inner lips of the two tuberosities of the ischial bones, the rami of the ischia and pubis, the ischio-sacral ligaments, and the point of the coccyx. In this way we speak of the plane of the inferior strait as one plane only; whereas, there are, in fact, two such planes, an anterior and a posterior.

"This figure exhibits the contour of the outlet. The line *c d* represents the transverse diameter. The letters *c e a e d* show the anterior semi-circumference, while *c f b f d* show the posterior semi-circumference of the outlet. Now from *c d* to *a* is an inclined plane, and from *c d* to *b* is another inclined plane. These planes intersect each other at an angle of 140°, and they ought to be distinguished as the anterior and as the posterior inclined planes of the perineal strait.

Fig. 90.



Outlet of the Pelvis.

"In midwifery it will be found that as the child descends, in order to escape from the womb, it first impinges upon the posterior inclined plane, which it depresses first, and then begins to depress the posterior edge of the anterior inclined plane. When it has succeeded in depressing the edges of the two planes, it escapes betwixt them, whereupon they resume their place like two valves, whose floating margins had been first violently separated, and then allowed to close again."]

314. Now what mechanical effects are these peculiarities calculated to produce upon the passage of the fœtal head? 1. It is evident that as certain diameters only of the child's head correspond to certain others of the pelvis, the gradual change in these must be followed by a similar change in the *position* of the head; because the expulsive force presses the head forwards, and it *can* only advance by making this adaptation. 2. The change in the direction of the axes, and the effect of the inclined planes, more especially of the curve of the sacrum, must necessarily effect a change in the *direction* in which the fœtal head moves; in fact, they alter it from that of the axis of the brim to that of the outlet.

But in order that this adjustment of position and alteration of diameter may be effected, two things are necessary—first, that the pains should continue (with intervals), and, secondly, that the fœtal head should correspond to the size of the pelvis; for if it be too small, it will want the due resistance, and may be driven through the pelvis irregularly; and if it be too large, it will not pass at all.

315. Our estimate of the passages, however, would be incomplete, if we did not regard the uterine cavity as forming one extremity of them. The long axis of the child's body is almost always in accordance with the long axis of the uterus; but previous to labor the latter is not in accordance with the axis of the brim, but rather more perpendicular: the uterine contractions, however, remedy this by tilting the fundus uteri forwards, and so place the child in the right line of direction for entering the pelvis.

316. Having said thus much of the passages generally, let us endeavor to estimate the *obstacles* which the head meets in its progress: the *first* of these is the *cervix uteri.* The resistance it offers appears to be the effect partly of muscular action and partly of its elastic cellular tissue; but, as Dr. Murphy has observed, more generally of the latter than the former, unless there be much irritation. The dilatation is evidently in the first instance purely mechanical, and effected by repeated efforts, rather than by great force at one time, but afterwards the dilatation is aided by muscular action. This will be rendered clear by considering the process more in detail. During the last few weeks of gestation, the cervix becomes slightly softened and dilated, and the result of the first pains which retract or elevate the child, is to press down a pouch of membranes filled with liquor amnii ("the bag of the waters"). This forms a firm, equable wedge, adapted to any size or form of os uteri, and which, as the uterine fibres of the body and fundus are stronger than those of the cervix, must be forced down into and through the os uteri with each pain, dilating it to the size of the wedge thus formed, and continuing the process until the membranes give way. So far, all is mere mechanical dilatation, but if a prolonged and careful examination be made, when the child's head is substituted for the wedge of membranes, it will be found that the contractions of the fibres of the cervix which at first narrow the os uteri, do at length retract it over the head more and more each time, until, at length, the combined retraction of the cervix and propulsion of the head, force the latter altogether through the os uteri. This is particularly ascertainable in certain cases, when the anterior lip is unusually long in dilating. Besides the effective way in which this arrangement attains its object, it has other advantages; the os uteri is dilated by the bag of the waters with far less pain than by the fœtal head.

The *second obstacle* is the bony circle of the brim of the pelvis, into which the head can only pass by the adaptation of certain of its diameters to those of the pelvis, and even the apposition is so exact that it requires a degree of compression, or "moulding" of the head, to facilitate its entrance. This is further aided by the head being placed obliquely in every way, and it is at length effected by repeated pains. When this moulding is completed, and the due position attained, the head is gradually propelled into and through the cavity, receding somewhat after each pain, and again advancing in a somewhat spiral direction, until it arrives at the *third obstacle*, or lower outlet, closed in by ligaments, muscles, cellular tissue, etc., and external to these the perineum. These tissues resist long, and their dilatation is very painful; they are first softened by mucous discharge, and then relaxed (how I know not), long before there is direct pressure upon them: afterwards, they are subject to alternate pressure by the head, and relaxation, until, being fully distended, they yield, and the head, directed forward by the curve of the sacrum, is applied directly to the vaginal orifice, and gradually, very gradually, forced through it.

With first children the mucous membrane of the orifice of the vagina is more or less everted, and frequently torn posteriorly, without the injury extending to the perineum.

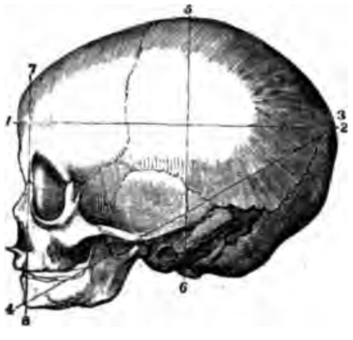
The amount of resistance varies in different subjects; it is greatest with first children, and in women of advanced age; it is also greater in the second than in the first stage, but more rapidly overcome, owing to the greater force employed. The facility with which the head traverses the pelvis depends partly upon the force, partly upon the resistance, and partly upon the amount of compression which the head will bear: this is very considerable, though it is less practicable if the sutures be ossified.

317. These obstacles constitute the natural division of labor into stages, the first terminating when the os uteri ceases to impede the descent of the head, and the second with the passage of the child through the lower outlet, as already mentioned.

The length of each stage is of course in proportion to the resistance, and inversely to the power employed; but in natural labors it is as about 2 or 3 to 1 (at least in first labors), *i. e.*, if the whole labor be12 hours, the first stage will probably be 8 or 9 hours; but, of course, this will vary much, and within certain limits without injury.

When, however, the entire labor is indefinitely prolonged, the relative proportion of the two stages is altogether destroyed, and either may be many times as long as the other. We shall speak of this by and by. Of the third stage (expulsion of the placenta) I shall treat under Natural Labor

Fig. 91.



Fœtal Head Diameters.

318. 3. The Child. — I have not much to add of the mechanical influence of the child in the process of labor, inasmuch as it is altogether passive. The measurements of the child's head are as follows: —

1. The longitudinal diameter from	4	to	4½	inches.
2. The transverse	3½	"	4	"
3. The occipito-mental or oblique			5	"
4. The cervico-bregmatic	4	"	4½	"
5. The trachelo-bregmatic	3½	"	4	"
6. The inter-auricular			3	"
7. The fronto-mental			3½	"

The first of these diameters corresponds to the oblique diameter of the brim and antero-posterior of the lower outlet; the second to the antero-posterior diameter of the brim and transverse of the lower outlet in ordinary cases; the third to the antero-posterior diameter of the lower outlet in face presentations: the others to certain diameters of the pelvis, to which the head is only transitorily applied.

The transverse diameter of the shoulders is from 4¾ to 5½ inches.
" " " hips " 4 " 5 "

These diameters being at right angles with the long diameter of the head, it follows that when the latter corresponds to the longer (or antero-posterior) diameter of the outlet, they will be exactly in apposition with the long diameter of the brim.

319. The diameters are pretty regular in well-developed infants, and correspond very closely to those of the clothed pelvis. Yet certain adaptations facilitate the transit of the child—viz., the compressibility of the head and body of the child, which it is calculated will permit it to be forced through a pelvis whose antero-posterior diameter at the brim is only three inches. And further, the head enters and passes through the pelvis obliquely, both as to its longitudinal and transverse axes, *i. e.*, one fontanelle and the anterior part of the presentation are lower than their opposites, thus diminishing the longitudinal transverse diameters from a quarter to half an inch.

This appears to be the proper place to notice some very interesting researches, published by Prof. Simpson, of Edinburgh,[1] on the different size of the head in male and female children, and the consequences which result to the mother and child.

He states that the head of the male at birth is larger than that of the female, in its circumference, by ⅜ths of an inch, in its transverse diameter by ⅛th, and in the inter-aural diameter by 2/8ths of an inch.

Now it appears from the following table, that the proportion of males is greater than that of females in some very important deviations from natural labor.

	Total Cases.	Males.	Females.	Proportion.
Tedious labor	119	65	54	148 to 101
Convulsions	28	17	11	153 " "
Puerperal fever	88	54	34	161 " "
Ruptured uterus	84	23	11	207 " "
Hemorrhage	44	31	13	240 " "
Forceps	24	16	8	200 " "
Crotchet cases	74	50	24	200 " "

From a large collection of facts bearing upon and illustrating the subject, the author has drawn the following conclusions of the dangers consequent upon this slight excess of size in male children.

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[1] Ed. Med. and Surg. Journal, Oct., 1844.

1. Of the mothers that die under parturition and its immediate consequences a much greater portion have given birth to male than female children.

2. Among labors presenting morbid complications and difficulties, the child is much oftener male than female.

3. Among the children of the mothers that die from labor or its consequences, a larger proportion of those that are still-born are male than female; and on the contrary, of those that are born alive, a larger proportion are female than male.

4. Of still-born children, a larger proportion are male than female.

5. Of the children that die during the actual progress of parturition, the number of males is much greater than the number of females.

6. Of those children born alive, more males than females are seen to suffer from the morbid states and injuries resulting from parturition.

7. More male than female children die in the earliest periods of infancy, and the disproportion between the mortality of the two sexes gradually diminishes from birth onwards until some time subsequently.

8. Of the children that die in utero and before the commencement of labor, as large a proportion are female as male.

9. In laborious labor with the head presenting, in proportion as the order of labor rises in difficulty, the amount of male births in them rises in number.

10. Of the morbid accidents that are liable to happen in connection with the third (second) stage of labor, as many take place with female as with male births.

11. More dangers and deaths occurs both to mothers and children in first than in subsequent labor.

12. The average duration of labor is longer with male than with female children.

The long axis of the child in general corresponds to the long axis of the uterus, though occasionally it is somewhat oblique: this, according to Desormeaux, occurs once in 249 cases, according to Meckel once in 287, and to Osiander once in 300 cases.

320. Having now considered these elementary powers or conditions of labor separately, we are prepared to examine them in action; in other words, to ascertain the MECHANISM OF PARTURITION. Nothing can be more simple, but certainly nothing more erroneous, than the views held by the older writers on midwifery. They concluded that the head passed through the pelvis, in the same position as that in which it emerges from it — that is, with its long diameter antero-posteriorly. The first writer who corrected this opinion was Sir Fielding Ould, of this city, who wrote in 1742, and who stated that in the first part of its progress the face is turned to one side or other of the pelvis, "so as to have the chin directly on one of the shoulders." Dr. Smellie in 1752 corrected the error of Ould with regard to the contortion of the child's neck, but in other respects agreed with Sir F. Ould. Similar opinions were promulgated in 1770 by Deleurye in France, and subsequently by Schmitt and Mampe in Germany.

The next step in advance was made (without inter-communication) by Saxtorph of Copenhagen, and Solayres de Renhac of Montpellier, who in 1771 published two essays, which agreed in this fact, that the long diameter of the head of the child, in natural labor, entered the pelvis in a direction neither parallel to the conjugate, nor to the transverse diameters of the brim, but parallel to one of its oblique diameters; that is, with the sagittal suture running in a line directed at one extremity to the sacro-iliac synchondrosis behind, and to the foramen ovale anteriorly. They further showed that of the two oblique diameters, the long axis of the head, in a very large proportion, occupied the left, or that running between the right sacro-iliac synchondrosis and left foramen ovale. M. Baudelocque adopted the opinions of his master, Solayres de Renhac, as the basis of his arrangement, and through his great influence the doctrine of the oblique position of the head has been generally diffused and received.

There were, however, many points which needed revision and correction; and for the full demonstration of that which was true, and the correction of that which was erroneous, with the addition of many new observations, we are indebted to the labors of Naegelè of Heidelberg, who in 1818 published his essay On the Mechanism of Parturition, which was translated into our language by Dr. Rigby in 1827. The more closely his opinions have been tested by experience and careful observation, the more clear does their correctness appear.

Having so high an estimate of the labors of M. Naegelè, the reader will not be surprised at my adoption of his descriptions in the present volume; and it would give me great pleasure if, on my recommendation, all my readers would peruse his excellent essay.

321. We have already stated that the position of the head is the relation which its diameters bear to those of the brim of the pelvis; or, in other words, the situation of the extreme points of the longitudinal diameter of the head compared with the extreme points of the oblique diameter of the brim. Now the former are sufficiently well indicated by the anterior and posterior fontanelles, and the latter by the foramen ovale, right and left, and the sacro-iliac synchondrosis, right and left.

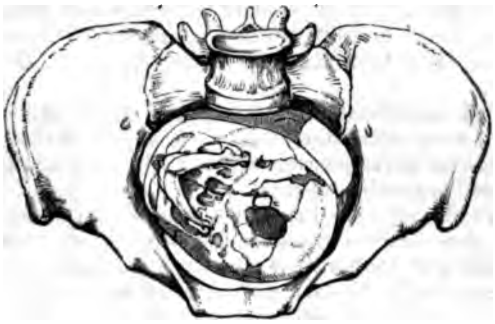
Naegelè states that the child usually presents with the head in either of two positions corresponding to the two oblique diameters, but with the superior fontanelle at either extremity; thus those I have called 1st and 3d will belong to the left oblique, and the 2d and 4th to the right oblique; but it is more convenient, with the majority of German and English modern writers, to make *four*, which therefore I have adopted. In the *first*, the posterior fontanelle corresponds to the left foramen ovale; in the *second*, to the right foramen ovale; in the *third*, to the right sacro-iliac synchondrosis; and in the *fourth* to the left sacro-iliac synchondrosis; the anterior fontanelle of course corresponding to the opposite extreme of the oblique diameter.

These numbers do not correspond with those affixed to the presentations of other writers; but in order that no confusion may arise, I shall give a table of the corresponding numerals of different authors:

Numbers affixed to Presentation by						Description of Presentation.
Rigby.	Naegelè. Capuron. Maygrier. Dugès. Halmagrand.	Baudelocque. Dubois. Gardien. Davis. Dewees.	La Chapelle.	Boivin. Hamant. Moreau.	Ramsbotham.	Anterior part of Cranium pointing to
1	1	1	1	1	3	Right sacro-iliac synchondrosis.
..	2	2	2	2	4	Left do. do.
2	3	4	3	4	6	Left foramen ovale.
..	4	5	4	5	5	Right do.
..	..	3	..	3	7	Promontory of sacrum.
..	..	6	..	6	8	Symphysis pubis.
..	..	..	5	7	1	Right os ilium.
..	..	..	6	8	2	Left do.

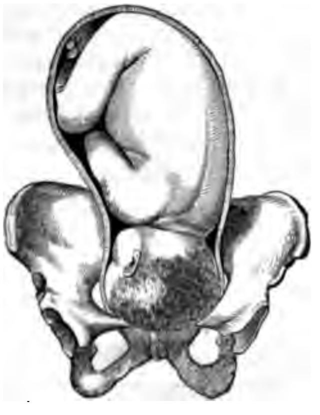
322. Now let us trace the progress of the head in the different positions. In the FIRST POSITION (fig. 92), it is, as I have stated, placed obliquely, corresponding to the right oblique diameter of the brim, the posterior fontanelle being towards the left foramen ovale or acetabulum, and the anterior towards the right sacro-iliac synchondrosis, the two fontanelles being at first on a level; consequently the sagittal suture will run nearly in the left oblique diameter of the brim, but rather nearer to the sacrum than the pubis, because the anterior half of the presentation is almost always lower than the posterior. If the finger be at this time introduced into the centre of the os uteri, at the very commencement of labor, it will impinge upon the right tuber parietale, above which and on the upper edge of the parietal bone, the primary tumor is formed.

Fig. 92.



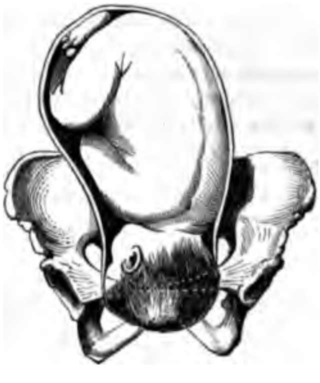
Mechanism of Parturition—First position.

[Fig. 93.]



Vertex Presentation: first position.

[Fig. 94.]

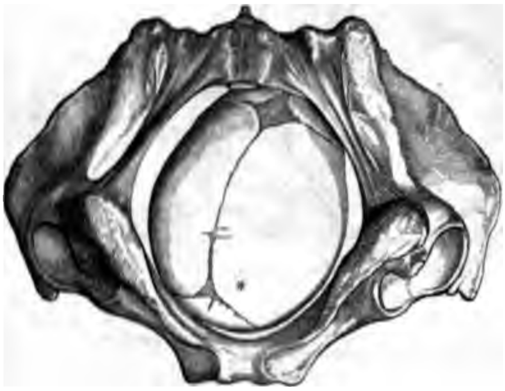


First Position of Vertex: first step in mechanism of labor.

By the action of the uterus the head is forced downwards into the cavity, preserving in some cases merely the obliquity it possessed at the brim; but in other cases it assumes an oblique position as regards its longitudinal axis; one fontanelle—generally the posterior—being lower than the other: this is more remarkable as the head advances. In other respects, the position of the head and the presenting part is unaltered in the cavity, the posterior fontanelle still corresponding to the foramen ovale, and not, as frequently stated, to the arch of the pubis.

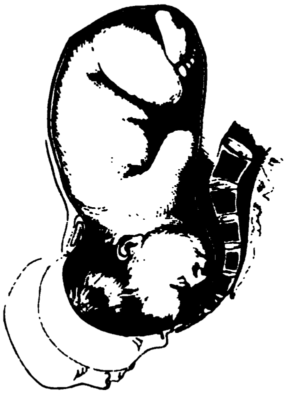
When the head arrives at the lower outlet, Naegelè observes, "by continued pressure of the uterine contractions the posterior fontanelle gradually moves itself by slight degrees, repeated at equal intervals, in a direction from left to right (frequently more or less from above downwards), and the occipital bone advances from the side of the pelvis under the arch of the pubis. It is not, however, the centre of the occiput that advances under the pubal arch, but the head approaches the os externum with the posterior and superior part of the right parietal bone and remains in this position until it has passed through the outlet of the pelvis with the greatest circumference which it opposes to it, when it then turns itself with the face completely towards the right thigh of the mother." That the head really passes thus obliquely through even the external parts may be proved by tracing the sagittal suture, which will be found running obliquely from left to right, and by examining the tumor of the scalp, which, after delivery, occupies the posterior and superior quarter of the right parietal bone, and a portion of the occipital bone, if there has been sufficient delay at the vaginal orifice.

[Fig. 95.]



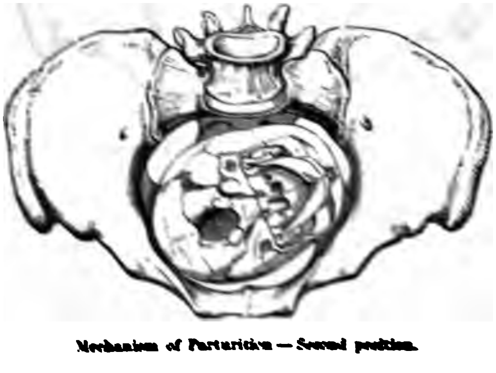
Outlet of the pelvis, with the fœtal head passing through in the first position. The asterisk marks the presenting portion.

[Fig 96.]



First Position of Vertex: third step in mechanism of labor.

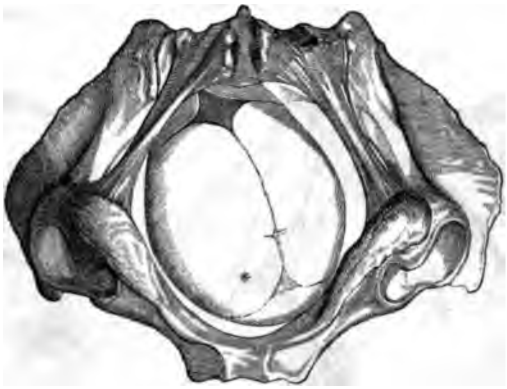
Fig. 97.



Mechanism of Parturition — Second position.

323. When the head is in the SECOND POSITION, (fig. 97), its longitudinal diameter corresponds to the right oblique diameter of the pelvis, and it is placed obliquely as in the former case, acquiring the second obliquity as it descends; and it passes through the pelvis and lower outlet precisely in the same mode as in the first position, only that the slight rotation is from right to left, and that when expelled it completes the quarter-turn, bringing the neck under the arch of the pubis.

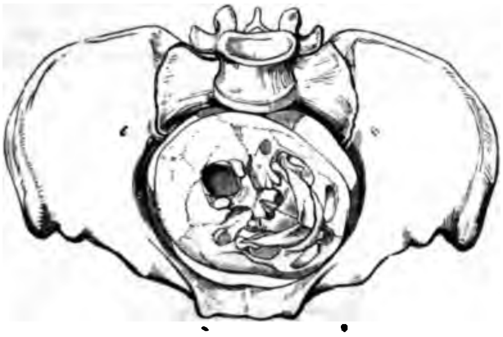
[Fig. 98.]



Outlet of the pelvis and the fœtal head passing through it in the second position. The asterisk marks the presenting position.

324. In the THIRD POSITION (fig. 99), the anterior fontanelle corresponds to the left acetabulum, and the posterior to the right sacro-iliac synchondrosis, at nearly the same level, until the pressure occasions one or other (generally the posterior) to descend. The sagittal suture divides the os uteri obliquely and unequally, and the tumor of the scalp is found upon the upper edge of the left parietal bone, nearly at an equal distance from its angles, and the finger, passed in the central line, impinges upon it.

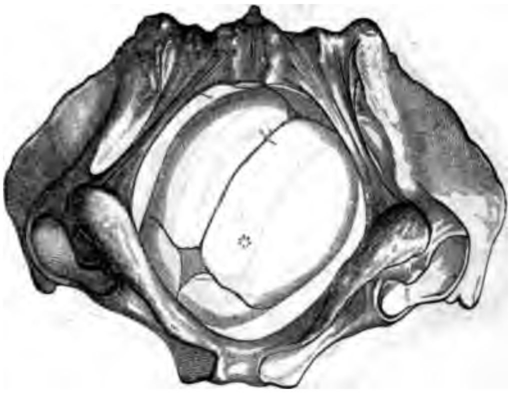
Fig. 99.



Mechanism of Parturition — Third position.

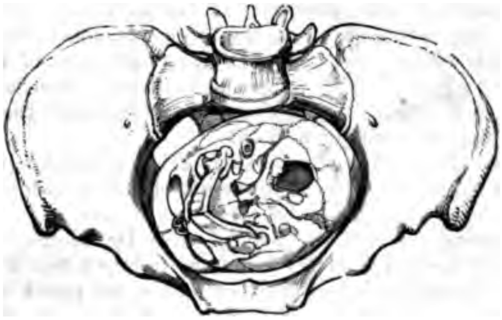
"As soon as the head is engaged in the cavity of the pelvis," Naegelè observes, "the great fontanelle turns towards the descending ramus of the left os ischium, and both can be felt at an equal height as to each other. As soon as the head experiences the resistance which the inferior part of the pelvic cavity opposes to it, or, in other words, the oblique surface which is formed by the lower end of the os sacrum by the os coccygis, the ischiatic ligaments, etc., by which it is compelled to move from its position backwards, in a direction forwards, it turns by degrees with its great diameter into the left oblique diameter of the pelvic cavity; *i. e.*, the posterior fontanelle is directed to the *right* foramen ovale, and as the head approaches nearer and nearer to the inferior aperture, it is the posterior and superior quarter of the left parietal bone, which is felt in the cavity of the pelvis, opposite to the pubal arch; so that when the point of the finger is introduced under and almost perpendicular to the symphysis pubis, it touches nearly the middle of the superior and posterior quarter of the left parietal bone; and this is precisely the part, as the head advances further, which first distends the labia, with which the head first enters the external passage, and the spot upon which the swelling of the integument forms itself." Thus, the head is changed from the third position into the second, and so passes out, the face, according to Naegelè, generally turning towards the left thigh of the mother.

[Fig. 100.]



Outlet of the pelvis, and the fœtal head in the third position.
The asterisk marks the presenting portion.

Fig. 101.

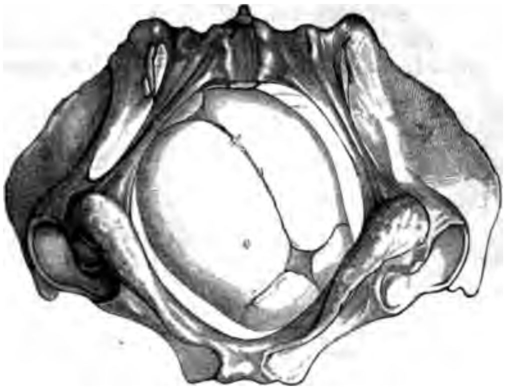


Mechanism of Parturition — Fourth position.

325. In the FOURTH POSITION (fig. 101), the posterior fontanelle corresponds to the left sacro-iliac synchondrosis, and the anterior fontanelle to the right

foramen ovale; and as the head is pressed through the cavity of the pelvis, changes analogous to those just described, take place, but in the opposite direction—that is, the head is turned from left to right, so as to bring the posterior fontanelle towards the left foramen ovale; in other words, that as the head is changed from the third to the second position, so from the fourth it changes into the first. It then passes out, exactly as it did when presenting in the first position. The primary tumor will be at the upper edge of the right parietal bone; but the pressure of the lower outlet will extend it over the tuber, to the upper and back part of this bone.

[Fig. 102.]



Outlet of the pelvis and fœtal head in the fourth position. The asterisk marks the presenting portion.

326. When the head presents in the third or fourth position, if the pelvis be unusually large, or the fœtal head unusually small, or even with a pelvis and head of ordinary proportions, if the pains come on very violently when the head is at the upper outlet, the changes into the second and first positions may not take place, owing to the absence of sufficient resistance or adequate time, but the head be driven through the pelvic cavity and lower outlet in the position (or nearly so) in which it presented at the brim, the upper and anterior part of the left (third position) or right (fourth position) parietal bone, and a portion of the superior part of the frontal of the same side corresponding to the arch of the pubis, and the posterior part of the right or left parietal bone, and part of the occipital, sweeping over the perineum. As the head passes out, the forehead looks upwards, under the arch of the pubis. Naegelè states: "Of ninety-six cases of the third vertex position, which I observed with particular care, and described in my note-book, I remarked the head *three times* to come through the external passages with the head upwards or forwards."

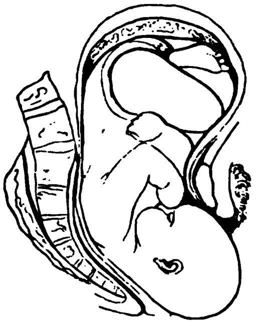
This occasions more suffering, and some delay, as the longitudinal diameter of the head is presented to the lower outlet without adaptation or modification.

["The mechanical form of the pelvis," says Dr. Meigs, "is so miraculously adapted to the wants of the economy in labor, that it has power, in a major part of these fourth positions, to rotate the vertex from the right sacro-iliac junction to the right acetabulum, and thence to the pubal arch; and that without any assistance given by the accoucheur.

"It is true that this favorable rotation sometimes requires the aid of the hand, or even of an instrument. It also occasionally happens, that neither the hand alone, nor any instrument, can enable the surgeon to bring the vertex round to the front. In such case, it slides into the hollow,of the sacrum, and the labor is thenceforward rendered more painful and more difficult.

"When, in fourth positions, the vertex can rotate first to the acetabulum, and then to the arch, the labor is not seriously retarded; but when the posterior fontanelle gets into the hollow of the sacrum, and will not suffer rotation, then the flexion becomes greater and greater as the fontanelle slides down along the point of the sacrum, along the face of the coccyx, and down the mesial line of the perineum, until having pushed off the perineum 4.10, the occipito-frontal diameter, the vertex slips over the fourchette, and immediately turns over backwards, in strong extension, which allows the forehead, eyes, nose, mouth and chin successively to emerge from underneath the crown of the pubal arch, to complete the birth of the head. The annexed figure of a head in an occipito-posterior position, show these truths clearly enough.

Fig. 103.



Head at the Lower Outlet in the fourth position.

"This is the mechanism in all cases of birth in occipito-posterior positions, without rotation to the front; and the student will clearly understand that it must be so, since the length of the line from forehead to vertex is too great to permit it to be otherwise."[1]]

327. Until very recently, the passage of the head with the forehead under the arch of the pubis was believed to be the ordinary termination of presentations in the third or fourth position; but since the publication of Naegelè's work has directed more careful attention to this point, abundant proof has been obtained "that what has been considered as a regular phenomenon is a deviation, and exactly that which has been esteemed a deviation from the usual course and rule is perfectly regular." Solayres de Renhac and W. I. Schmitt noticed the change from the third into the second position; but for the minute explanation we are indebted to M. Naegelè.

328. As to the comparative frequency of the four positions, there is no doubt of the greater predominance of the *first;* it occurred to Naegelè in the proportion of 69 per cent. of all his head presentations; to Madame Lachapelle in 77 per cent.; to Madame Boivin in 80 per cent., and to M. Halmagrand in the ratio of 74 per cent.

The *fourth* position is also confessedly the least frequent, occurring to M. Naegelè in the ratio of ·03 per cent.; to Lachapelle and Halmagrand in ·04 per cent.; and to Madame Boivin in ·05 per cent.

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[1] [Obstetrics,—the Science and the Art.]

There is a great difference of statement, however, as to the comparative frequency of the *second* and *third* positions; thus Naegelè, in 1290 cases, only met with the *second* position in one instance, or in the proportion of ·07 per cent. M. Halmagrand describes it as occurring in 5 per cent.; Madame Boivin in 19 per cent.; and Madame Lachapelle in 21 per cent. On the other hand, Naegelè found 359 cases of the *third* position in 1210 cases, or 29 per cent.; while Madame Lachapelle gives only ·077 per cent. of such cases, and Madame Boivin only ·05. Dr. Simpson observed accurately the positions in 335 cases of cranial presentation, and found the first position in 256 cases, the second in 1, the third in 76, and the fourth in 2 cases.

Dr. Swayne, of Bristol, found that in 286 cases, the first position occurred in 247; the second in 28; the third in 3; and the fourth in 8 cases.[1] Dr. Miller, of Louisville, found the fourth position more frequent than the third, and both less frequent than the second.

It is extremely difficult to explain these discrepancies satisfactorily. M. Naegelè conceives that the examination was not made until after the change from the third into the second position had been effected; and he thinks that this opinion is confirmed by the fact that the frequency of the second position of authors agrees with the frequency with which he has observed the head to present in the third position. The researches of Dr. Breen, Professor Simpson, etc., have led them to coincide with Naegelè, and correctly so, in my opinion.

329. DIAGNOSIS. — The diagnosis of the positions of the head is a matter of some difficulty, and requires delicacy of tact and experience; of course, the difficulty is greater before the os uteri is fully dilated. Naegelè has laid some stress upon the fact, that the movements of the child are felt more on one side than the other; so that when this happens on the right side, as is most frequent, we may presume the head to be in the *first* position, and when on the left side, in the *second.* That this observation is correct, my experience leads me to believe; but it affords no means of distinguishing between the first and fourth, nor between the second and third positions.

The stethoscope has also been called in to our aid, and in many instances the information it affords is conclusive. We cannot always distinguish a head from a breech presentation by it; but if by other means we can ascertain that the head presents, it is possible by this means to detect the position earlier than by any other. "Thus," M. Naegelè, jun., observes, "if, in a case of vertex presentation, the pulsations of the fœtal heart are distinctly heard in the left inferior abdominal region, diminishing in intensity as the ear leaves this part, but extending upwards and forwards, and continuing audible as far as the linea alba, or even beyond it, it may be presumed that the head occupies the first position. We are warranted in supposing that the head is situated in the second position if the heart's pulsations are most distinctly heard in the right side of the abdomen."[2]

Careful observation of the movements of the child, and of the stethoscopic phenomena, have also led to the conclusion, that in some cases the child takes up its position at an early period, and does not change it till birth; whilst in other cases the changes are frequent, but diminish towards the eighth month. The fœtal heart will always be found to correspond with the motions of the child as felt by the mother.

330. We possess an unfailing test of the correctness of our diagnosis in the tumor of the scalp, or "caput succedaneum," as it has been called. It is formed by the pressure of the head against the openings through which

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[1] Prov. Med. Surg. Journal.

[2] A Treatise on Obstetric Auscultation, translated by Dr. West, p. 71.

it has to pass — *i. e.*, first against the circle of the os uteri, and secondly against the circumference of the vaginal orifice, and it always forms on the lowest or presenting part, so that the primary tumor indicates the part of the head which presented at the os uteri, and the primary and second together, that which occupied the lower orifice. The tumor itself consists most frequently of serum, sometimes with blood mixed, and in a few cases of blood alone.[1]

We have already seen, that, in the first position, the primary tumor occupies the right tuber parietale, and the secondary, in addition, the posterior and superior angle of the parietal bone, with a part of the occipital bone: in the second position, it occupies the left tuber parietale primarily, and the posterior angle secondarily: in the third, the primary tumor is somewhat anterior to the left tuber parietale; but by the change to the second position the tuber and posterior part of the bone becomes the seat of the secondary tumor: and in the fourth, the primary tumor is anterior to the right tuber parietale, but the secondary tumor includes it and the posterior part of the bone.

CHAPTER III.

PARTURITION.—CLASS I. NATURAL LABOR.

331. Definition.—The term "natural labor" is applied to those cases in which the head presents, and descends regularly into the pelvis; where the process is uncomplicated, and concluded by the natural powers within twenty-four hours (each stage being of due proportion), with safety to the mother and child, and in which the placenta is expelled in due time.

Slight differences will be found in the definitions given by different authors; for instance, Dr. Power limits the time to six hours; Dr. Cooper to twelve; whilst Dr. Breen extends it to thirty hours. Dr. Burns also includes the fœtus having arrived at the full term; but these variations are of comparatively little importance. Within the limits I have laid down there will be found room for great diversity in the peculiar features of each case, and experience teaches us that scarcely any two labors are exactly alike. First labors are in general more tedious than subsequent ones, at least when the resistance is chiefly from the soft parts.

332. The following table will show the proportional duration of labors:—

Authors.	Total No. of Cases.	Terminated in 6 hours.	In 12 hours.	In 18 hours.	In 24 hours.	Above 24 hours.
Dr. Merriman . . .	500	206	398	442	450	
Dr. Collins . . .	15,850	13,012	15,084	15,346	15,586	264
Dr. Maunsell . . .	839	347	647	734	793	86
Dr. Beatty . . .	1182	577	958	. .	1114	69
Dr. Churchill . . .	1285	366	760	. .	1119	166
Dr. Granville . . .	640	. .	515	above 12 hours		104
Drs. M'Clintock and Hardy	6634	3882	5280	5706	5852	269

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[1] Churchill on Diseases of Children, p. 66.

In addition to these specific details, I may mention that Dr. Smellie calculated that 990 in 1000 are natural labors: Dr. Leake 900 in 1000; Dr. Bland found 1792 cases of natural labor in 1897 cases; Dr. Jos. Clarke 9748 in 10,199; Dr. Merriman 2607 in 2735; Dr. Lever 4266 in 4666; and Professor Assalini, out of 269 cases, reports 205 as "quick and easy."

333. It will be observed that I have inserted a parenthesis in the definition, to the effect that each stage should be in due proportion to the other (*i. e.*, the first to the second as 2 or 3 to 1), and this I have done to guard against the error of making time (or the *entire* duration of the labor) our sole standard, instead of symptoms; for a labor may be natural as to time (*i. e.*, completed within twenty-four hours), and yet if the first stage be very short (say one or two hours), and the second prolonged (say twenty hours), the character of the labor may be altogether changed, and the formidable symptoms of powerless labor be developed.

334. PRECURSORY SYMPTOMS.—Before describing the ordinary course of labor, it is necessary to point out certain symptoms which indicate its approach. These vary in intensity in different women: in some they are but slight, and may perhaps pass unnoticed; in others they are very well marked. The most important are,—1, the subsidence of the abdomen; 2, frequent micturition; 3, griping and tenesmus; 4, painless uterine contractions; and 5, mucous discharge from the vagina. Let us examine each of them briefly.

335. 1. *Subsidence of the abdomen.*—We have heretofore seen (§ 157), that at the commencement of the ninth month the fundus uteri reaches to the ensiform cartilage; but that during the last month it subsides: this is especially remarkable during the last fortnight, and is sufficiently marked to attract the attention of the patient. The uterine tumor becomes apparently less, and sinks forward. It may probably be owing partly to the absorption of the liquor amnii, partly to the lower end of the uterus sinking into the pelvis, and partly to some relaxation of the uterine tissue permitting a greater amount of lateral expansion, and a consequent diminution in its height. The tilting forward is owing to a relaxation of the abdominal parietes, and increases in successive pregnancies: sometimes, though rarely, it is so excessive as to require the support of a bandage, and even to retard the first stage of labor by deranging the axis of the uterus.

336. 2. *Frequent micturition.*—In proportion to the enlargement of the uterus, is the pressure exercised by it upon the neighboring viscera. During the last month, when it sinks down into the pelvis, and falls forward, the pressure upon the bladder is considerable, and its capacity is so much diminished as to render a frequent evacuation of its contents necessary. In addition, there is a certain reflex influence from the uterus to the bladder, and an increase of irritability in the latter, on account of which it is less tolerant of the presence of urine than under ordinary circumstances. Its value as a sign of approaching labor, however, is lessened by the fact that it occurs from the same causes, just before the uterus rises out of the pelvis, and that it may be present during several weeks in the latter part of gestation.

337. 8. *Griping, tenesmus, or diarrhœa.*—Similar mechanical and reflex effects of advanced gestation to those just noticed, may be produced in the rectum and large intestines, and the result will be an irritable state of the bowels, occasional griping pains, and a desire to go to stool when but little is passed. It must ever be remembered that this frequent passing of a small quantity of fluid fæces is quite compatible with a great accumulation of fæcal matter above the seat of the irritation, and may often be relieved by a free evacuation. It is an uncertain sign of the approach of labor.

338. 4. *Painless uterine contractions.*—During the last month of gesta-

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tion, and especially towards its termination, patients frequently notice a squeezing sensation in the abdomen, which lasts for a little time, then subsides, and is not attended with pain. As was remarked by Leroux, if the hand be placed upon the abdomen, the uterus will be felt tolerably hard, well defined, and tilted forwards. This partial contraction appears in some cases to be excited by the movements of the child. I have never observed it till towards the termination of pregnancy, except in cases of threatened abortion or premature delivery. Velpeau states that the cervix uteri may also be felt alternately relaxed and contracted.

It appears extremely probable that by this painless mechanism is effected that change in the cervix and os uteri which have been observed to take place previous to actual labor.

339. 5. *Mucous discharge of the vagina.*—This is called "the shows" by nurses: it is generally observed about twenty-four hours previous to the commencement of actual labor, and evidently prepares the passages for the transit of the fœtus. The quantity and quality vary: sometimes the fluid is thin, in other cases thick and viscid (which Wigand says is more favorable), becoming thinner at the time of labor; some women have it profusely, others scantily. It is generally colorless until labor has set in; but during the dilatation of the os uteri, striæ of blood are mixed with it, arising from the rupture of some of the small vessels of the cervix uteri.

340. Of these precursory symptoms, it will be remarked, that the first and third only indicate an advanced period of gestation; the fourth, according to my experience, that labor is not far off; but the fifth is the only one which shows that it is close at hand.

In addition to these more marked symptoms, many minor ones might be enumerated; such, for instance, as swelling of the labia and lower extremities, cramps in the thighs and legs, the improvement of the appetite and spirits, diminution of the dyspnœa, a sense of greater lightness and facility of walking, etc.; but these being unequal and uncertain, are therefore of less value.

341. SYMPTOMS OF LABOR. — I shall now proceed to the description of labor in each stage; first detailing the phenomena, and afterwards prescribing the requisite management. Before I proceed, I should wish to impress upon my junior readers the extreme importance of carefully and minutely studying the subject of natural labor, not merely in books, which must necessarily be imperfect, but at the bedside of the patient. No case of labor, however simple, can be attended without some addition to our knowledge, if we are vigilant: almost all recent improvements in practice have arisen, and I believe all future ones will arise, from a more perfect knowledge of the natural process, and a more correct appreciation of the natural powers.

As I have already treated of the mechanical and vital agencies employed in effecting delivery, I shall now confine myself to a practical consideration of the results.

342. The commencement of labor is dated by the patient from the moment that the uterine contractions become painful, and correctly so, provided the entire uterus be engaged, if they recur regularly and continue without suspension. But this is not always the case; the uterus not unfrequently at first acts partially, irregularly, and inefficiently: such efforts are called "*false or spurious pains.*" They arise from various causes, such as over-fatigue, indigestion, constipation, cold, etc., and are occasionally excited by the motions of the child. A little careful observation will enable us to distinguish them from true pains, as they commence about the fundus, and are of limited extent, recur at regular intervals, are not attended with the mucous discharge from the vagina (§ 339), and do not dilate the os uteri, or protrude the "bag of the waters;" on the other hand, true pains

generally commence in the lower part of the uterus, and are first felt in the back, extending gradually to the front, recurring with regularity though increasing in frequency, dilating the os uteri, and protruding the membranes.

As these false pains may occur at any period of gestation, and sometimes bring on labor prematurely, or when at the full term occasion distress and loss of rest, it is always desirable to relieve them: this may generally be done by rest, if the patient have been fatigued, or by aromatic purgatives, followed by an opiate, if the stomach and bowels are deranged.

343. The *true pains* recur at regular intervals, gradually increasing in frequency and power; and each pain from its commencement augments in intensity, until, having arrived at its maximum, it remains stationary for a short time, and then subsides: thus presenting, as it were, a type of the entire course of the pains.

The pains exhibit, however, different characteristics according to the stage of labor, and have therefore been divided into two kinds, "*cutting or grinding pains*," and "*bearing down or forcing pains*." The cutting or grinding pains" are indicative of, and confined to, the first stage of labor, during the dilatation of the os uteri. They are short, severe, and not very frequent, obliging the patient to suspend her occupation, and partially arresting respiration, but not inducing any voluntary efforts. They are generally (but not always) seated in the back, gradually extending round the loins to the abdomen and thighs. The suffering they occasion is very considerable, and although (except in some irritable subjects) it is less than that which accompanies the stronger pains of the second stage, yet it appears more difficult to bear, and the patient gives utterance to groans and loud outcries. The outcry which attends upon the cutting pains, is an excellent diagnotic mark of the first stage of labor, and in some cases we are obliged to depend upon it alone.

344. During the *first stage* we generally find the patient more irritable and restless than subsequently, moving from one place to another, and changing both occupation and position frequently: she is low spirited and fearful, weeping from dread rather than suffering, anticipating evil, and scarcely to be comforted. This distressing state disappears, however, as the labor advances. In some cases the despondency which has darkened the last few months of pregnancy is exchanged for cheerfulness and courage the moment labor sets in. In general I have remarked, that, whatever the mental condition may have been during pregnancy, and even the first stage of labor, the violent pains, severe suffering, and hard work of the second stage, occupy the mind as well as body, to the exclusion of desponding anticipations, and, as it were, rouse up all the patient's energy and courage to meet the exigencies of the case. A singular deviation from mental integrity, apparently from extreme suffering, has been the subject of a valuable essay by my friend, Dr. Montgomery; I allude to the partial and temporary delirium which occurs occasionally, just as the head is passing through the os uteri or os externum. It seldom lasts more than a few minutes, and in one case I attended the patient was conscious of talking incoherently, but felt quite unable to arrest herself.

345. During the first stage of labor, and especially at the time the head passes through the os uteri, severe rigors occur; not from cold, as they are observed equally when the patient is warm, but as the prelude to a pain. The surface is generally of the usual temperature, and free from perspiration, at least till near the end of the stage. The pulse is seldom permanently quickened until the second stage: although, as Hohl has remarked, if it be carefully examined, it will be found to become more frequent during the first part of a pain, then to remain stationary for a moment, and afterwards to subside.

During this stage also, the stomach is apt to become irritable, and discharge its contents, probably from sympathy with the uterus, rather than from mechanical pressure, as the abdominal muscles are as yet inactive. This is always beneficial, as it not only removes indigestible matters which may be in the stomach, but certainly relaxes the cervix uteri.

346. If the hand be placed upon the abdomen when the pains come on, the uterine tumor will be observed to contract, become hard, and tilt itself forward, so as ultimately to bring the axis of its cavity into complete accordance with that of the brim; and after remaining in this state for a longer or shorter time, it relaxes, but does not quite return to its pristine flaccidity.

The results of auscultation are very interesting: M. Hohl[1] thus describes them: "If we direct our attention to the changes of tone which the uterine pulsations present, we shall find them generally stronger, more distinct, and varied in tone during labor, and this is especially the case just before a pain comes on. Even if the patient wished to conceal her pains, this phenomenon, and more especially the rapidity of the beats, would enable us to ascertain the truth. The moment a pain begins, and even before the patient herself is aware of it, we hear a sudden short rushing sound, which appears to proceed from the liquor amnii, and to be partly produced by the movements of the child, which seems to anticipate the coming on of the contraction; nearly at the same moment all the tones of the arterial pulsations become stronger; other tones, which have not been heard before, and which are of a piping resonant character, now become audible, and seem to vibrate through the stethoscope, like the sound of a string which has been struck, and drawn tighter while in the act of vibrating. The whole tone of the uterine circulation rises in point of pitch. Shortly after this, viz.: as the pain becomes stronger and more general, the uterine sound seems, as it were, to become more and more distant, until, at length, it becomes very dull, or altogether inaudible. But as soon as the pain has reached its height, and gradually declines, the sound is again heard as full as at the beginning of the pain, and resumes its former tone, which, in the intervals between the pains, is as it was during pregnancy, but somewhat louder."

347. An *internal* or *vaginal* examination reveals to us the condition of the passages, the state of the os uteri, and the rate of progress. At an early period, the vagina will be found cool, moist or dry, and undilated, of nearly the calibre it was before labor commenced; as it advances, however, even during the first stage, the entire canal becomes more flaccid, and if not dilated, at least relaxable and dilatable. The os uteri is high up, but not always in the same situation: in first labors it is nearer to the promontory of the sacrum than the symphysis pubis; in subsequent confinements this is often reversed. The lips of the orifice are sometimes soft and thick; in other cases hard and thin; the former dilate more readily, and the latter generally become softer and thicker, before dilatation takes place. At the commencement of labor the orifice will readily admit the point of the forefinger, and by the repeated pains it is gradually widened, so as to allow the child to pass. The rate of dilatation is slowest at the beginning; it is said, and I believe truly, to take as much, or more time to dilate the os uteri to the size of half-a-crown, than to complete the process; and for a very evident reason — viz., the want of a mechanical dilating force (§ 303), the bag of the waters not being protruded until some progress has been made.

If the finger be maintained in the orifice during a pain, we feel the circle tighten and become hard, until the head is pressing through the cervix; after which time the lips are retracted by each contraction. We ascertain the progress of the labor by carefully estimating the advance made by each pain.

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[1] Die geburtshülfliche Exploration, part i., sect. 105.

348. Towards the end of the first stage, or at the time when the os uteri is pretty well dilated, we remark an increase of the sanguineous striæ in the vaginal discharge, and the accession of voluntary efforts, slight at first, but gradually increasing. About this time generally, the membranes give way, the liquor amnii escapes, and by the next pain the head is forced through the os uteri, and enters upon the *second stage.*

The phenomena are now somewhat changed, especially in their intensity. The pains are more frequent and longer, the intervals shorter, and the suffering greater in general: but owing to the necessity of fixing the chest as a fulcrum for muscular exertion, the breath is suspended during a pain, and the outcry suppressed, except at its termination. The character of the outcry is therefore as good a test of the second stage as of the first. At the accession of each pain the patient holds her breath, and seizing hold of something with her hands, brings the muscles of the extremities, of the back and abdomen, to aid the expulsive efforts of the uterus. These are the "bearing-down pains" of the second stage.

It is not easy to explain the change in the character of the pains, nor why straining should occur only in the second stage. Wigand attributes it to sympathy between the os uteri and vagina, and between the abdominal and other muscles. It certainly cannot be merely owing to the presence of the fœtal head in the vagina. No doubt the increased resistance, and the necessity for more power to overcome it, is the final cause, though we cannot thus explain the immediate change, which I believe to be a reflex action, due to pressure upon the lips of the os uteri, and soft parts of the cavity and outlet, as the same effect may often be produced by pressure with the finger, just as we may double the strength of the pains by pressure upon the edge of the perineum, at a later period.

Further, the arrest of the circulation, from the suspension of respiration, distends the cutaneous vessels, the surface becomes florid, the face almost purple, the veins of the forehead, temples, and neck are distended, and the eyes are bright and prominent; the heat of the skin is greatly increased, and a profuse perspiration ensues. The pulse, which was quiet during the first stage, or at most quickened during a pain, is now increased in frequency during an interval, and the changes noticed by Hohl, are very remarkable during the pains; *i. e.*, it becomes more frequent at the setting in of each pain, until it attains its maximum rapidity, at which it remains for a short time stationary, and then subsides. At the termination of the second stage it will generally be found to range between ninety and one hundred and twenty beats in a minute.

The effects of this arrest of respiration and forcible bearing down are sometimes very injurious. Dr. Blundell mentions having seen a case of general emphysema during labor, which he thinks is owing to a rupture of the larger air tubes. A similar case is reported by Dr. Abbot, in which the whole face, neck, and chest, were emphysematous. It subsided, eight or nine days after labor, without any unpleasant consequences.

349. Vomiting also frequently occurs; but in the second stage it is as much the result of pressure as of reflex irritation, and it is generally favorable, as it seems to relax the soft parts. However, as it is a symptom developed also in unfavorable cases, it may be well to observe, that it may reasonably excite uneasiness when it comes on with symptoms of collapse (during this stage), after the sudden cessation of uterine action; when symptoms of fever, such as rapid pulse, furred tongue, heat of skin, etc., are present; when it is accompanied by abdominal tenderness; and especially if the fluid be sanguineous or dark colored.

If the second stage be prolonged, the patient often feels heavy and sleepy, and may doze between the pains,—the result of the fatigue, combined with the congestion about the face and head. Under ordinary circumstances this need excite no uneasiness, as the patient is refreshed by it; but if it be excessive, and accompanied with headache, especially in primapara, we must be watchful, and on our guard against an attack of convulsions.

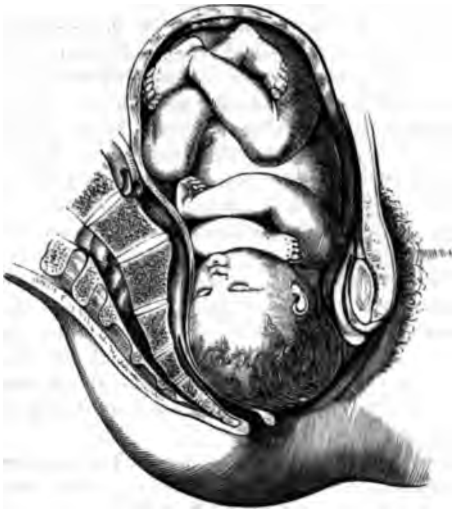
As the head advances through the pelvis, it presses more or less upon the nerves which pass through that cavity to the lower extremities, and gives rise to spasms and cramps, which add to the suffering of the patient. They may be partially relieved by friction.

The pressure of the head also evacuates the contents of the rectum, but effectually prevents the emptying of the bladder.

350. If an *internal* examination be made at the beginning of the second stage, we shall find the vagina dilatable, and as though it had been dilated, its walls rugous and flabby, and prepared to yield to the pressure of the head. The head itself will be perceived at the upper part of the pelvis, filling it more or less completely, descending with each pain, and receding at its conclusion; the advance exceeding the recession, and the excess marking the rate of progress of the labor. At a later period the head will be felt on the floor of the pelvis, where it meets with considerable resistance, but which is overcome by the mechanism already described (§ 303): we observe here the same repeated advance and recession, the head each time propelled a little further than before, and often with a kind of spiral movement, until, after a time proportioned to the difference between the force employed and the resistance, the obstacles yield, and the head presses upon the perineum, which undergoes the same process of dilatation.

351. At this period of the labor, when the head is distending the perineum and dilating the external orifice, both the suffering and the exertion reach their maximum point; and yet it is beautiful to observe how cautiously (so to speak) and how securely the process is effected. Adequate expulsive force is called into action; and if it were continuous nothing could save the

Fig. 104.



Head at the Lower Outlet.

patient from injury; but each pain is just long enough to gain upon the advance made by its predecessor; and the head, detained for a few moments at its furthest point of advance, then recedes; and this is repeated until the perineum is completely softened, and the os externum dilated. Nor is this all; the resistance offered by the perineum carries the head forward, so that its lowest point (the tumor) shall press against the os, and by the time the perineum yields, the orifice is sufficiently wide to secure the proper direction of the head in its transit.

At the latter part of the second stage, the pains are often what is called "double;" *i. e.*, they succeed each other so quickly, that a new one commences before the former has quite terminated. At length the force conquers all resistance, and with a throe of agony the head is expelled; after which there is a short rest, equal to two or three pains, then the uterine power is again exerted to expel the body of the child.

The second stage is now completed; the suffering, which was intense, is exchanged for perfect ease, and the sense of relief is inexpressibly great. If the hand be placed on the abdomen, it will be found flabby, the uterus large, and moderately contracted.

352. The *third stage* of labor includes the detachment and expulsion of the placenta. In some cases, the contractions which expel the child, expel the after-birth. In almost all cases, however, it is partially or wholly detached, remaining in the uterus or vagina, from whence it may be expelled by the natural powers alone, or aided by general traction.

The interval which elapses after the expulsion of the child, before the uterus again actively contracts to expel the placenta, varies somewhat in different cases, apparently according to the fatigue that organ has undergone. Dr. Clarke found the average interval to be twenty minutes. Out of 654 cases which I have accurately noted in my own private practice, I find that in 468 the placenta was expelled in (within) five minutes; in 119 cases, within ten minutes; in 35, within fifteen minutes; in 16, within twenty minutes; and in 18 within half an hour.

Where due attention has not been paid, the interval will be longer; but from the above data we may conclude that in natural labor the placenta is more or less detached by the concluding pains of the second stage of labor, and that it ought to be expelled within an hour or an hour and a half, and that when the interval exceeds this, the case fairly comes under the order of "retained placenta," of which I shall treat hereafter.

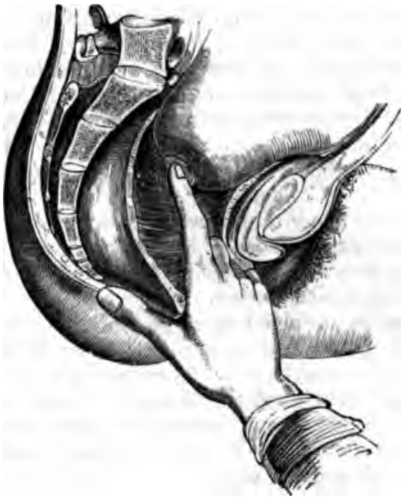
When this interval, whatever it be, has elapsed, the uterus again contracts, but much less forcibly, and by one or two pains, the connection between the placenta and uterus is completely severed, the now useless appendage is extruded into the vagina, and by the contraction of this canal is expelled, with a gush of blood or clots (*dolores cruenti*). The bag of the membranes is generally turned inside out, especially if the after-birth have been extracted by pulling the cord, and the situation of the perforation in the membranes through which the child passed will enable us to estimate the distance of the placenta from the os uteri; the distance of the perforation from the placenta being exactly the same as the distance of the latter from the os uteri.

353. MANAGEMENT OF NATURAL LABOR. — Let us now turn from the description of the phenomena of natural labor to a consideration of the duties of the attending accoucheur, and the mode of managing such cases. I have already stated that most of the modern improvements in midwifery have resulted from a more correct appreciation of the natural powers; so in the management of natural labor the great improvement has been the absence of interference. There is, in truth, but very little for the accoucheur *to do*, if the case be natural and the circumstances favorable, and very little

that he needs, except patience and gentleness; and therefore the old practice of carrying certain instruments and certain medicines about with him is strongly to be deprecated, as to say the least, a needless exposure of himself to temptation. All the surgical appliances needed are, an elastic-gum catheter (male) and a lancet; and, if in the country, a small quantity of laudanum, ergot, and tartar emetic. He ought also to be provided with a few strong pins, and some ligatures of twine or tape; and if there be a prospect of much delay, he will not be the worse of a book in his pocket. But to return; although there is little to do in a natural labor, we cannot of course *assume* that any case to which we may be called is of this class, without inquiry; our first object, then, when summoned to a patient, is to ascertain her *present state*, whether she be in labor or not, etc.; if she be, the *presentation* and *position* of the child, the *rate of progress* and *probable termination* of the labor.

354. As to the present state of the patient, a careful examination of the bodily functions generally, and of the pulse, tongue, skin, etc., will show whether the patient is in ordinary health, or whether we may have to contend with any complication, as fever or organic disease; and the information may enable us to anticipate, and perhaps prevent some attacks. A more minute investigation must be instituted into the state of the uterine system, as to the presence of *true* pains; their frequency, force, and regularity; the character of the outcry, the amount of voluntary effort, the quantity and quality of vaginal discharge, etc. By these symptoms, we shall be able to form an opinion as to the existence of labor, the stage and rate of progress, and the preparedness of the passages, etc., and also as to the propriety of seeking for more special information, by means of a vaginal examination. This will add to the information previously acquired, a knowledge of the presentation and position.

Fig. 105.



Vaginal Examination.

255. It is not possible to fix a definite time for this examination; for in many cases it will depend upon the patient. It may, however, be stated generally, that it is satisfactory to make it as early as convenient, and that

certainly no time should be lost after the escape of the waters, lest we miss the best opportunity for rectifying a mal-presentation. Further, the attendant should never leave his patient for more than a few minutes, unless he has ascertained that all is right. The frequency with which the examination should be repeated must depend chiefly upon the rate of progress. During the first stage (judging by the outcry and cool skin) it is scarcely necessary, if once we have ascertained that all is right; but during the second stage, it may be repeated according to the rapidity of the advance, every four, six, eight, or ten pains; and when once the head distends the perineum, the accoucheur should keep his finger upon the head during each pain, so as to regulate the support necessary for the perineum. To the junior student only can any directions as to the mode of making an examination be necessary, and they may be brief. The patient should lie upon her left side, with the hips near to the edge of the bed, and the knees drawn up towards the abdomen. The forefinger of the right hand (or two fingers, and in some cases those of the left hand) having been well oiled or soaped, should be passed along the perineum, and into the vaginal orifice; it is then to be directed upwards and backwards, towards the promontory of the sacrum, until the os uteri or the presenting part be found. Having done this, we shall be able to estimate the calibre, heat, and moisture of the vagina, the dilatability of the os uteri, the resiliency and general condition of the cervix, as well as the actual dilatation by the bag of the waters, or the fœtal head, during a pain. If the membranes be entire, an experienced finger will in most cases detect the presentation; if they have given way this will be much more easy and certain; and if it be the head, by finding the fontanelles and comparing their situation with certain parts of the pelvis, the position may be determined.

It is generally recommended to introduce the finger during a pain, as less unpleasant to the patient; but the examination must occupy both a pain and an interval, if we hope to obtain full information. A comparison of the knowledge thus obtained, with the frequency and force of the pains, will enable us to estimate the *rate of progress* of the labor; and these results, combined with the local and general condition of the patient, will afford adequate grounds for our *prognosis*. In conclusion, I would earnestly recommend to my junior readers to take every opportunity of passing the catheter and making vaginal examinations in the dead subject as well as the living.

356. We will now suppose that the conclusion from these investigations is favorable, that the patient is in good health, is really in labor, that the head presents, and that she is making a sufficiently rapid progress, with every prospect of a safe termination.

It is not necessary during the first stage, that the accoucheur should stay in the room with the patient, nor even in the house, if the progress be slow; before leaving her, however, he must be certain that all is right, that everything is in readiness; and he must give some general directions to the nurse. The patient is better out of bed during the early part of the labor, if it happen in the daytime, as she will be less fatigued, and probably less impatient than if she lay in bed the whole time; she may rest on the sofa when tired, and occasionally walk about, or pursue any slight occupation if she be able.

It is very desirable to keep her tranquil and cheerful, for which purpose she should be told of all that is favorable in her case, and all subjects calculated to depress her spirits should be avoided. In this matter much depends on the nurse, who should receive proper cautions. I am satisfied that in most, if not in all cases, it is better to deal frankly with our patient, and not to make false promises in hopes of encouraging her to bear the pains.

Let her be told that all is favorable, and that, as far as we can judge, the labor will terminate safely for herself and her child, and she will bear to be told that she has yet some time to suffer. Moreover, as it is impossible to calculate with accuracy upon the duration of a labor, an assurance that it will be over in a certain time will, in all probability, issue in disappointment; and if so, in distrust either of our truth or skill. I have dwelt upon this the more, because nothing is more common than for the patient to beg of the attendant to say how long she will have to endure the pains.

During this first stage the patient may be allowed her usual diet, but without stimulants, as it is rather advantageous to have the stomach occupied. The bowels should be freed by medicine or enemata, if necessary, and the urine regularly evacuated; and it may be as well to put my junior readers on their guard against a frequent error of nurses, in confounding the dribbling of the liquor amnii, after the rupture of the membranes, with "passing water." I need not say that this may take place, and yet the patient suffer from retention of urine.

357. The patient should be cautioned against making any voluntary effort during the first stage; at least, until obliged by the increasing violence of the pains, as no effort can at this time hasten the labor. "Women," says Dr. Denman, "may be assured that the best state of mind they can be in at the time of labor is that of submission to the necessities of their situation; that those who are most patient actually suffer the least; that if they are resigned to their pains, it is impossible for them to do wrong, and that attention is far more frequently required to prevent hurry than to forward a labor."

Neither is it necessary, as was formerly taught, for the accoucheur to endeavor to hasten the labor by manual dilatation of the os uteri or passages; such an "abominable custom," as Denman justly calls it, would rather have the effect of retarding the labor by the irritation it would occasion, and might, as in a case I witnessed, give rise to inflammation, and sloughing afterwards.

358. Among the matters which should be in readiness are two or three short pieces of tape or twine, for tying the navel-string, a pair of scissors, some strong pins, and a binder. The latter should be made of a double of diaper, nearly half a yard wide, and long enough to go round the hips, and to allow for pinning over. These things ought to be provided by the nurse; but as labor sometimes occurs unexpectedly, or the nurse may be forgetful, it is well for the attendant to have a supply of twine and pins, with a pair of scissors, in his pocket-case. Towards the end of the first stage it is customary for the nurse to "make the bed," which is done by placing a skin of leather or a square of oiled silk over the blanket and mattress, to protect it, at that part of the bed which will be occupied by the patient's hips; over this is placed the sheet, and upon this two or three sheets folded square, on which the patient is to be placed. These folded sheets will absorb most of the discharges, and can afterwards be removed without disturbing the patient, leaving dry bed-linen underneath. The skin or oiled silk is allowed to remain for some time longer.

359. Soon after the second stage of labor has set in, the patient (especially if she have borne children before) should undress, and go to bed. The position for delivery has varied in different times, and still varies in different countries. In the earliest times the sitting posture was preferred; and in Ambrose Paré, Deventer, and other old writers, we have a description and plates of labor-chairs, one of which the late Professor Hamilton used to exhibit to his class. In China and Cornwall the patient is delivered upon her knees, or leaning over something. In Darfour a pole is fixed across the room, which the patient holds with both her hands, and is delivered standing

In France, and some parts of Germany, the woman is placed upon her back, with the knees drawn up; but serious objections exist to either of these plans; by far the best and most natural position is the one now adopted almost universally in Great Britain and in many parts of the Continent — viz., on the left side, the hips being close to the edge of the bed, and the knees drawn up towards the abdomen. It is usual to place a pillow between the knees to keep them separate, but I cannot say that I think it of any service. The patient's night-dress should be drawn up underneath her, above the hips, to escape soiling; and she may be allowed to grasp a sheet fastened to the bed-post, or, what is much better, the hand of an attendant.

But although I have advised that the patient should lie down soon after the commencement of the second stage, it is not necessary that she should remain in the one position the whole time, provided that the proper one be assumed before the head presses upon the perineum.

[The position upon the left side, with the knees drawn up, is that almost universally directed by American accoucheurs, and it is certainly the one which is the most convenient to the practitioner, and productive of the least possible exposure of the female's person. It is only, however, when the labor is proceeding rapidly that it is necessary for the female to retain, uninterruptedly, the position described. Change of position, or even rising from the bed and sitting in an easy chair, in cases where the labor is proceeding slowly, will conduce to the comfort of the patient, while, at the same time, it will often prevent injurious consequences from the heat, pressure, and constraint liable to result from long continuance in one position.]

360. In most cases the liquor amnii escapes about the beginning of the second stage, but occasionally, when the membranes are unusually tough, they remain entire until the head has cleared the os uteri, or even, but more rarely, until it is passing through the os externum. When we are quite satisfied that the head has passed through the os uteri, we may rupture the membranes by pressing the finger against them during a pain, as their integrity is an impediment to the advance of the child after this time; but it should not be done hastily, nor until we are certain that their usefulness is at an end. When the patient becomes hot, the bed-clothes should be lightened, and the room at all times be kept pleasantly cool and fresh. Food cannot be taken at an advanced period of the labor, but warm drink, such as whey, gruel, or tea, may be allowed.

361. When the head is on the floor of the pelvis, the accoucheur should take his place by the bed-side, and examine gently during each pain for the purpose of deciding when it is necessary to support the perineum. The object in supporting the perineum is twofold; first, to afford a moderate counterpoise externally to the pressure exerted from within, so as to prevent the structures yielding under sudden or severe pains; and secondly, to prolong (as it were) the curve of the sacrum, and so make certain of the head being carried forward to the orifice of the vagina, instead of being forced through the perineum for want of such a direction forwards. Now to fulfil these two objects, it is clear that we need not interfere at all until the perineum is distended and protruding; but when we find this to be the case, then we should cover the left hand with a soft napkin, and apply the back of it along or across the perineum, commencing at the coccyx and reaching to the anterior edge. The amount of pressure needed is but little; no attempt must be made to retard the progress of the head; but whilst the perineum near the coccyx is firmly supported, the more anterior portion should be left free to yield before the pressure of the head. Neither is the skin to be retracted when the head presses through the orifice, but rather carried forward, so as to lessen the chance of laceration.

Either hand may of course be used; I prefer the left, because it leaves the right at liberty to examine, and to receive the head of the child.

Let me repeat, that to make our assistance useful, and not injurious, the support should be moderate, equable, and rather firmer near the coccyx (but yielding as that bone yields), than towards the anterior edge; that it need not be afforded until the perineum protrudes; that then it should be afforded during each pain, and until the pain has entirely ceased. I really believe that it would be better not to touch the perineum than to make injudicious pressure; it has been my lot to witness more than one case where rupture was owing to excessive and injudicious support.

362. As the head passes through the vaginal orifice, the accoucheur should receive it into his right hand, allowing it to make the usual rotation, and carrying it forwards as the pains expel the shoulders and body of the child. The left hand must be employed in supporting the perineum as the shoulders press forward. When the head is expelled, the nurse should be directed to make gentle steady pressure upon the uterus, and to follow it down, keeping her hand firmly upon it until the binder is applied; by so doing we shall rarely have any trouble or delay with the after-birth. In the large majority of cases in which I have taken care that this practice was adopted, the placenta was expelled within ten minutes, as I have recently shown.

When the child is born, its mouth should be examined, and any mucus that may have accumulated in it removed.

It not unfrequently happens that the funis is coiled around the child's neck, and fears have been expressed of its retarding the expulsion of the body, or causing the rupture of the cord, or the inversion of the uterus. These fears I believe to be unfounded, for extensive researches show that the funis is never twisted round the neck, unless it be beyond the ordinary length, and yet the ordinary length is sufficient to permit the birth of the child, after deducting the amount lost in the coiling. A very few cases are on record of cords so short (six or eight inches) as to require division before the child could be delivered; but in ordinary cases, if we find, on examination with the finger when the head has escaped, that the cord is twisted round the neck, all we need do is to draw down more of the cord, and slip the loop over the head or shoulders. If we cannot do this, we must loosen the cord as much as we can, so as to prevent the strangulation of its vessels, and then wait for the uterus to expel the child.

363. There is generally a short interval after the head is born before the pain expels the body, and it occasionally, though seldom, happens, that this interval is prolonged, to the manifest risk of the child, whose face and head become livid and swollen, and it endeavors in vain to breathe. If it be allowed to remain thus, it will die of apoplexy; but, on the other hand, if we extract it hastily, without uterine action, there is danger of hemorrhage. Under these circumstances, we have the choice of two evils, and must choose the least: the nurse should be directed to use friction over the uterus, and, if this fail in exciting it to action, she must make firm pressure on that organ, whilst the accoucheur takes hold of the child's head, and inserts a finger into the axilla, and gently extracts the body. The hemorrhage may be prevented by pressure, but nothing can save the child but removal. I have repeatedly acted thus, and without any ill consequences.

364. If the child be healthy, and have not suffered from pressure, etc., it will cry as soon as it is born, and when respiration is established, it may be separated from its mother, rolled in flannel, and removed. This having been done, the hand should be placed upon the abdomen to ascertain (from the size of the uterus) whether there be twins; if not, we may proceed to apply the binder, which should embrace the hips inferiorly and the whole abdomen.

It should be pinned firmly, but not too tight, and be kept on during the whole time the patient is in bed. I do not know that we can consider the binder *absolutely* necessary. Dr. Davis states that he has not used one for fifteen or twenty years, except in cases of flooding; and Mr. Kesteven has written an elaborate paper to disprove its necessity and to show that its supposed advantages have been exaggerated.[1] I cannot agree with these gentlemen, however, for I am satisfied that it is very useful, at first in maintaining a certain degree of contraction of the uterus, and giving support to the abdomen, and afterwards in promoting a return to the natural condition of the uterine and abdominal parietes; for which reason I think it deserving of rather more attention than is usually paid to it, at least after the first day or two. I believe that, if it be duly applied during the time the patient keeps her bed, she will avoid that loose state of the integuments, which gives rise to what is called "pendulous belly."

[It is not the general custom in this country to apply the binder until after the delivery of the placenta, nor until then do we think it necessary. When, however, the labor is completed, the application of a proper bandage adapted to embrace the entire abdomen from the pubes to the cartilages of the ribs, and to gently and moderately compress the uterus, is a measure from which the best effects are always derived. It gives an agreeable sense of support—prevents the faintness which is liable to follow the expulsion of the fœtus and secundines, especially in cases of rapid labor occurring in delicate subjects—assists the contraction of the uterus, and in this manner is an additional guard against hemorrhage. The bandage should be so applied as to make the most pressure at the hypogastrium and the least at the upper portion of the abdomen. In many cases it may be desirable to augment the compression directly over the uterus by the application at this point of a napkin, once or twice folded, beneath the binder.]

365. When the binder is applied the hand should be placed firmly upon the fundus uteri,[2] and the patient may be allowed to rest awhile, if there be no flooding; after which, *when the uterus contracts*, gentle traction should be made by the funis, to ascertain if the placenta be detached; if so, and especially if it be the vagina, it may be removed by continuing the traction steadily in the axis of the upper outlet at first, at the same time making pressure upon the uterus; if the cord do not yield, the after-birth is not detached as yet, and *no force must be used.* A little patience, with occasional frictions to the uterus, will be all that is necessary.

[In our attempt to extract the placenta by careful and judiciously directed traction on the cord, the latter is to be taken hold of, with one hand, near its cut extremity, and entwined about the two first fingers to render the hold more secure, while the first two fingers of the other hand are passed, along the course of the cord, into the vagina, as well to note the progress of extraction, as to facilitate this by gently depressing the cord and by serving, at the same time, as a pulley to give a proper direction to the tractive force exerted upon the cord. Traction is to be made in the first instance in a direction downwards and backwards, until the placenta has reached the vagina, when the direction of the traction is to be changed to upwards and forwards, in the direction of the axis of the vagina. The position of the hand is very well illustrated by fig. 106.]

After the placenta has been expelled or withdrawn, the binder may be tightened if necessary, and a warm napkin applied to the external parts. The soiled sheets underneath the patient may be removed, and the night-dress drawn down; but no further change should be made for two or three hours, as it is most important for the patient to avoid all exertion at this time. In some places and with some practitioners it is customary to give stimulants on the completion of labor; but as they are unnecessary in ordinary cases, they must be used very moderately. Rest and quiet are the best and only necessary restoratives. A still stronger objection exists in my mind against the practice of giving a dose of laudanum, unless specially called for, as it may suspend uterine action, and give rise to hemorrhage. We may depend upon it that nature is fully equal to the emergency, and that the less we interfere the better for our patient; in the words of an eminent writer, "Meddlesome midwifery is bad."

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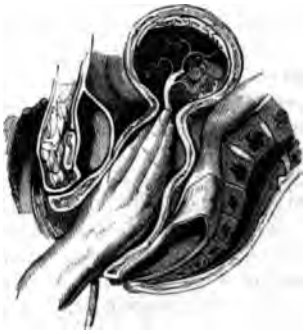
[1] Med. Gazette, Sept. 12th, 1851. The binder is the subject of a paper in the Lancet, July 7, 1855, by Dr. Gilmour, of Liverpool.

[2] Robertson's Phys. and Diseases of Women and Midwifery, p. 354.

[Fig. 106.]



Extraction of the Placenta and Membranes.

Although our duties are now ended as far as the mother is concerned, we should allow an hour to elapse before leaving the house, and before we go we should carefully examine the surface, pulse, uterine tumor, etc., and ascertain from the nurse the amount of discharge, so that we may be satisfied that all is right, or if wrong, that we may remedy it promptly. We ought also to visit the patient after six or eight hours, to see that the progress of the convalescence (to be presently described) is favorable.

366. Now let us return to the child: after waiting until respiration is fully established, or until the pulsation in the cord cease, a ligature is to be placed upon the funis about two inches from the navel, and a second a few inches further on; and the cord divided between the two by the scissors. Some foreign writers object to the ligature as unnecessary, and the case of animals has been brought forward as a proof; but Dr. Hunter has shown that their mode of dividing the funis prevents hemorrhage by the "torsion" exercised upon the vessels, and most practitioners of any standing must have met with cases where hemorrhage occurred in spite of a ligature; so that in these countries the propriety of the practice is generally admitted. In former times, as we find from the writings of Johnson, Aikin, Whyte, and others, but one ligature was used; but on the authority of Denman, the second ligature was added to prevent mischief, if there should be a second child with a vascular communication (as sometimes happens) between the two placentæ. Dr. Dewees objects to this, on the ground that the loss of blood hastens the extrusion of the placenta; and Dr. Wood's[1] experiments so far confirm Dr. Dewees' opinion. The end of the funis should always be examined before the child is dressed, and if any oozing have occurred, an additional ligature must be applied nearer to the umbilicus. This fragment

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[1] Edinburgh Monthly Journal, June, 1849, p. 853.

of the funis gradually dries up, withers, and falls off on the fifth or sixth day generally, though the time may vary from the second to the fifteenth day; and the surface contracts and cicatrices. In some cases, however, the centre remains red, prominent, and moist, like a large granulation, with or without bleeding. I have found it cured easily by alum or nitrate of silver. In one case Dr. Simpson mentions[1] that the granulation increased to the size of a cherry, and was not relieved by caustics; he applied a ligature around its base, and it dropped off in a few days.

367. Thus far I have described the ordinary management of ordinary cases, both as regards mother and child; but there are not unfrequently slight deviations from this simple course, and some of them as regards the child must now be noticed. For instance, when born it may be in a state of *defective vitality*, *asphyxia*, or *apoplexy*.

1. It may be in a state of *anœmia*, *syncope*, or *asphyxia*, from uterine hemorrhage, too early detachment of the placenta, or defective nutrition. In these cases very feeble, if any, efforts at inspiration take place, there is no pulsation in the cord, and the action of the heart is very weak. There is consequently no object in preserving the utero-fœtal connection; the funis should be tied and divided, and the child plunged into a warm bath: if this fail, cold effusion must be tried: but that which I have seen most effectual, is light and rapid friction of the body and extremities with warm flannel, with or without stimulants. Tickling the nose or fauces with a feather, electricity, and stimulating enemata, have been recommended; but I am not aware that they have been very successful. Inflation may be tried by means of a proper tube introduced into the larynx, or a flexible catheter passed through the nose, and with greater prospect of success than most of the other means. Great care must be taken to introduce the instrument cautiously and correctly, and to inflate slowly and gently. The "Marshall Hall" method has recently been successfully employed in these cases, and in all it ought to be tried, but I have found friction the most effective. In some cases, the infant, apparently healthy, is born dead, without anything in the nature of the labor to account for death; and in such cases, I have been led to believe, it may be owing to intra-uterine pressure upon the cord, perhaps from its being coiled round the body or limbs.

2. In other cases, the child may be in a state of *oppression or asphyxia* from prolonged labor, or from some deviation from the normal presentation, etc.; but in such instances the pulsations of the funis, though weak, are perceptible, the color of the surface is natural, and the shape of the head is unaltered. Here it would evidently be wrong to divide the cord until respiration has been established; therefore, placing the infant in such a position that there shall be no impediment to the circulation through the cord, we must adopt some of the plans already mentioned for its restoration. Friction with hot flannel, warm baths, aspersion with cold water, stimulants to the surface, or inflation may be in turn tried, until the child makes an effort to breathe. When it has fully recovered, the cord may be tied and divided. If these means fail, we may try the effect of loss of blood by cutting across the cord and allowing a dessert or table-spoonful of blood to escape before applying the ligature. Should this not succeed, the case is hopeless.

3. There is a third class of cases when the child is threatened with or attacked by *apoplexy*, from prolonged labor, the pressure of a narrow pelvis, or (as already noticed) from an interval elapsing between the birth of the head and body. In such, the heart's action is labored, the pulsation in the cord feeble and oppressed, the surface blue, the face livid, and in some cases the form of the head is changed. The treatment is exactly the opposite of

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[1] Edinburgh Monthly Journal, July, 1847.

that for the first class of cases; unless the circulation be relieved, the child will die of cerebral congestion or apoplexy; therefore the first thing to be done is to divide the cord, and allow from half an ounce to an ounce of blood to escape; after which we generally find the surface paler, the pulse quicker and firmer, and an effort made to respire; the cord may then be tied. If respiration do not take place, cold sprinkling, warm baths, friction or inflation may be tried.

Dr. Ogier Ward read an interesting paper before the Royal Medico-Chirurgical Society, upon the immediate and more remote effects of compression of the head during parturition. To this he attributes symptoms of imperfect cerebral development and its consequences, epilepsy and paralysis. The remedy he considers to consist in establishing full respiration as soon as possible, during which the depressed portion of the skull may be observed to expand and assume its natural shape.[1]

I have only to add, that in all these cases we should, not be easily discouraged, but continue our efforts for a considerable time, as we often succeed after a longer time than we should have believed possible.

[The assertion has been made by authorities of great weight, that in every case of simply suspended animation in the new-born infant—that is to say, in every case where there is no defect of development in any important organ, and where no vital part has received serious injury either before or during birth—it is possible, by proper management on the part of the medical attendant, to induce respiration, and by so doing secure life and viability to the still-born fœtus. This assertion is entirely confirmed by our own experience.

In a very able lecture on suspended fœtal animation, its causes and management, published by Dr. J. Gaillard Thomas, of New York, in the early part of 1860, the cases of still-birth are arranged into four classes. In the first, the non-occurrence of respiration is referred to non-oxygenation of the blood of the fœtus during the latter portion of its intra-uterine existence, in consequence of compression of the cord, of severe and protracted compression of the placenta, from a spasmodic or unintermittent contraction of the uterus, as takes place especially under the influence of ergot, to hemorrhage from partial or complete separation of the placenta, previously to birth, and finally to maternal loxæmia. In this form of still-birth, there is duskiness of the infant's face, purple and pouting lips, glassy eye, non-flaccid, unyielding limbs, a very feeble intermittent, or no pulsation of the heart, and entire absence of respiration. The treatment of this form of asphyxia neonatorum is to excite, if possible, respiration, by removing any mucus that may be accumulated about the fauces of the infant, by slapping it smartly upon the buttocks and chest; by blowing suddenly and forcibly in its face and mouth, and dashing cold water upon it with the hand. These failing, we should expose the infant to a draught of cold air, and while thus exposed, put at once in practice Marshall Hall's plan of postural respiration. The action of the lungs being thus induced, the circulation is to be promoted by upward friction of the limbs with the hand, without intermission of the respiratory efforts, and when the stagnation of blood in the lungs is disappearing, but not before, by the use of the warm bath.

A second form of still-birth is produced, according to Dr. Thomas, by the fœtus being subjected during birth to causes which produce a sudden cessation of the heart's action, as compression of the fœtal brain, from overlapping of the bones of the skull at the sutures in its passage through the pelvis, loss of blood, from rupture of the cord, or an arrest of the supply of blood to the fœtus by the compression of the flaccid coats of the veins, while the more unyielding coats of the arteries allow a flow of blood from it towards the placenta. The child still-born from these causes is pallid, its limbs are flaccid, and its face sunken and cadaverous. In these cases, the first endeavor should be to establish respiration and circulation by the same means as have been just detailed. The cord should not be divided or tied, until respiration is fully established; it should be gently stripped by the fingers in such a manner as to press all the blood it contains slowly and steadily into the infant's body.

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[1] Lancet, March 15th, 1851.

The third form of still-birth is from cerebral congestion. It is caused by obstruction of the circulation through the vessels of the neck, in cases of face presentation, by the constriction of these vessels by the cord, and by the compression of the chest in cases of tardy delivery of the shoulders. The infant presents a dark purple congested condition of the face, puffed and violet-colored lips, protruding eyes, and general intumescence of the head. The treatment in such cases is embodied, according to Dr. Thomas, in the following three directions: 1st. Let blood flow freely from the severed cord, to the extent of an ounce or more, as the symptoms may demand; 2d. Establish artificial respiration; and 3d, Avoid the warm bath.

The fourth form of still-birth is from hemorrhage of the brain, the result of intense or persistent congestion of the encephalic vessels, or of injury of the fœtal head by its being forced, by violent uterine efforts, against some prominence of a deformed pelvis, or by the unskilful use of instruments. Cerebral hemorrhage may be suspected in the still-born infant when, in addition to the symptoms of congestion, there is a stupid, listless condition continuing after the establishment of respiration, or when an attack of convulsions supervenes, followed, in both instances, within a short period by death. In the very few cases in which the infant survives, it may continue hemiplegic for many months, and ultimately recover. The treatment is the same as in still-births from cerebral congestions.]

368. The *tumor of the scalp*, already noticed, subsides in a very short time, without requiring any application in most instances; other cases, however, are not so tractable. The more simple tumors consist of serum effused underneath the scalp; others, of serum mixed with blood: again, in more rare cases, we find blood effused under the pericranium; and lastly, in addition to the blood effused, the pericranium appears to secrete a ridge of bony substance limiting the effusion. These *cephalæmatomata*, which are very rare, are about the size of an almond, apparently not painful, and may be distinguished by their persisting for several days, and by the semicircular ridge or boundary, which can be felt by the finger.[1] No doubt they are frequently the result of pressure, but not always, as I have seen them form twenty-four hours after birth; and they do not disappear as do the other forms of tumor. Spirit or stimulating lotions may be used, and in some cases they will be successful; in others it will be necessary to lay open the tumor and apply simple dressings. The reader may consult upon this subject, essays by Wagstaffe, Gedding, Naegelè, etc., and the works of Osiander, Michaelis, Grœtzer and Valleix.

369. The only remaining deviation from the normal condition of the infant which I shall notice, is *umbilical hemorrhage*, either before, or much more frequently after, the separation of the remains of the navel-string, and which is always very difficult to manage, and often fatal to the infant.

It is not of very frequent occurrence, which may be the reason why it has been omitted from most systematic works, or treated very slightly. However, increasing attention has been shown to it latterly, and we possess valuable papers on the subject by Radford,[1] Homans,[2] Ray,[3] Bowditch,[4] Pout, Manley,[5] Bailey,[6] Minot,[7] Willing,[8] and Smith.[9]

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[1] Churchill's Diseases of Children, p. 66.

It is remarkable that the majority of the cases on record were male infants, and also that in some cases there appeared something like an hereditary predisposition, two or three children of the same family having been attacked. Mr. Ray's case was the third male child (of the same mother) who had died of umbilical hemorrhage, and he mentions having been informed of a family in which four male children died from the same cause. Out of thirty-two cases collected by Dr. Minot, twenty-two were males and ten females. He mentions one case, communicated by Dr. A. Hooker, of a woman who lost four children, and another who lost two, in this way.

370. The *causes* of this hemorrhage are somewhat obscure; in some cases it seems to be owing to a defective ligature of the cord; but in others, and these are the more numerous, to causes more deeply seated. I think the cases, as far as our knowledge extends, may be classified as follows:

1. If violence be used to the remnant of the funis at any period before its decadence, it may give rise to hemorrhage, as in the case recorded by Dr. Hill.[10]

2. If, when the remains of the funis fall off, the vessels have not undergone the process of closure and healing, a very alarming hemorrhage may result, and one it may be impossible to arrest. Of this kind were Dr. Radford's and Mr. Willing's cases.

3. In a case which occurred in my own practice, about a fortnight after the child's birth, the navel became inflamed, a small collection of matter formed, and its spontaneous discharge was accompanied by a good deal of blood. When the abscess was empty, I succeeded fortunately in stopping the bleeding, by pressure and astringents.

4. Some of these cases seem to depend upon an unclosed state of the umbilical vessels, or defective hepatic ducts; although this does not invariably cause bleeding. An American physician, Dr. Anderson, of New York, has favored me with an example, in which the ductus communis choledochus was imperforate, giving rise to jaundice, and umbilical hemorrhage. Dr. Minot mentions that in one case the gall ducts were wholly absent; in another the ductus communis terminated in a "cul-de-sac;" and in a third, it was closed by a plug of inspissated bile.

5. In a large proportion of cases, the hemorrhage is accompanied by jaundice, whether dependent upon malformation or not, and certainly not always connected with organic disease of the liver; although Dr. Minot mentions that in three or four out of seven cases it presented deviations from the ordinary healthy appearance. It has been suggested by Dr. West,[11] and maintained by Drs. Bowditch, Homans, Bailey, Manley, and Minot, that the disposition to hemorrhage from the navel may, and probably does, depend upon some morbid condition of the blood,[12] as shown by the disposition to hemorrhage in other parts, analogous to what we see in adults. As Dr. Minot remarks, "the facts which I have collected lead me to think that idiopathic hemorrhage from the umbilicus in young infants is only one of the various manifestations of the hemorrhagic diathesis, which in other

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[1] Edin. Med. and Surg. Journal, July, 1832, p. 520.

[2] Boston Med. and Surg. Journ., July 11, 1849.

[3] Med. Gazette, March, 1849.

[4] Amer. Journ., of Med. Science, Jan. 1850, p. 63.

[5] Med. Gazette, May 3d, 1850.

[6] Amer. Journ., of Med. Science, April 1852, p. 432.

[7] Ibid., October, 1852, p. 318.

[8] Med. Times and Gazette, March 25th, 1854.

[9] Ibid., Nov. 3, 1855.

[10] London Med. Gazette, vol. lii. p. 556.

[11] On Diseases of Infancy and Childhood.

[12] Campbell on Icterus Infantum. Northern Journal of Med., Aug. 1844. Adams, Amer. Journ. of Med. Science, April, 1851, p. 364.

cases is exhibited in bleeding from the gums, mouth, stomach, intestines, etc., and in the appearance of purpuric spots beneath the skin in various parts of the body. In proof of this we see the occurrence of these phenomena with umbilical hemorrhage. Thus nothing is more common in the latter disease than a purpuric eruption. In three cases, there were bloody dejections; and in one, bleeding from the gums. Another argument is the thin and watery condition of the blood, and its deficiency in fibrine, whereby mechanical means become almost wholly inefficacious to arrest its flow.[1]

6. Finally, we have the cases which exhibit an hereditary tendency to hemorrhage, as I have already mentioned, whether the proximate causes of the diathesis be malformation, organic disease, or an abnormal condition of the blood. It does not appear that the character or duration of the labor has any influence in the production of this accident. The labor was easy and natural in most cases.

371. *Symptoms.* — The period at which the hemorrhage occurs varies from the third to the eighteenth day. In eleven cases, Dr. Bowditch found the average was seven days and three quarters; in Mr. Ray's case it came on the tenth day; in Mr. Bailey's, on the ninth and twelfth days. Of forty-one cases, Dr. Minot states that the average was the eighth day: in four cases it began before the separation of the cord; in three immediately after; in others at periods varying from one to thirteen days.

It is remarkable that most of the children seem to be healthy at birth, some few only appearing feeble. In some cases (nine out of thirty-nine, according to Dr. Minot) the hemorrhage appeared without any previous symptoms; but in a large majority it was preceded by other symptoms, and principally by jaundice, with constipation and clay-colored stools. In some rare cases, the child has appeared to be in pain, and in a few, cerebral symptoms have occurred. Upon the whole, however, there are but two prominent symptoms which are generally present — viz., the bleeding and the jaundice, and the latter, as I have stated, not always. Unless when the portion of the navel-string is removed by violence, or some violence is applied to the umbilicus afterwards, the hemorrhage is neither rapid nor projected in jets from any visible vessel, but rather a continuous weeping. Dr. Bowditch observes that "the funis drops off, and usually nothing abnormal is observed, or at most, only a delicate sponginess of the umbilicus. After three or four days an oozing commences, which either increases with every application, or perhaps is slightly checked by astringents, etc.; but it almost always proves fatal, and the patients before death become perfectly blanched. In these cases it is very common to observe an alteration in the structure and functions of the liver; the dejections being non-bilious, and at the post-mortem examination, disease of the hepatic structure, or of the ducts, being observed."[2]

The character of the blood is ordinarily described as thin, and of unusually light color, and in general it does not coagulate, so that we may conclude that it contains less fibrine than in health.

The most frequent termination is in death; in fact, almost all the cases terminate unfavorably; it may be at any period from the first day of hemorrhage to the seventh or eighth, according to the rapidity or continuousness of the bleeding.

I have already alluded to the principal *post-mortem* revelations. One or more of the hepatic vessels may be defective or impervious, the duct of the gall-bladder may be impervious or obstructed, the liver may be congested,

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[1] Amer. Journ. of Med., Oct. 1852.

[2] Amer. Journ. of Med. Science, Jan. 30th, 1852, p. 64.

[illegible] M. [illegible] was arrested and [illegible] but [illegible] Dr. [illegible] was tried, and [illegible] Dr. Brown [illegible] posed to this plan, as [illegible] inflammation and so caused death. Dr. Manley [illegible]

In [illegible] cases the same remedies may be tried, but [illegible] hope of success, as the hemorrhage is not local, but dependent upon [illegible] which we have little or no control. Dr. Minot suggests the internal use of [illegible] and astringents, and I think with reason, treating the patient as we would a case of purpura, or hemorrhage from the mucous membrane.

Dr. Ray and Dr. Bowditch suggest the employment of the actual cautery in these cases, nor do I see any objection to trying it in such hopeless cases, if other means fail. We must do all we can to keep up the strength by means of nourishment—milk, broth, wine and water, etc.

Thus it appears that our list of remedies comprises strong astringents, pressure, caustics, the actual cautery, and the ligature. Dr. Minot remarks, that of his cases, those in which the bleeding was permanently arrested, were by the following means: compression in three cases; ligature in three; [illegible] in one; plaster of Paris in one; scrapings of shoe leather in one, and nitrate of silver in one case. But although the bleeding was arrested, yet in several of the cases the infant died from exhaustion produced by it.

As prophylactic treatment Dr. Ray suggests attention to the mother's health during gestation; abundance of healthy natural nourishment for the child after birth; and that in families where this accident has occurred, the accoucheur should daily superintend the dressing of the navel until it has quite healed, using collodion styptics or compression. Dr. M. S. Perry suggests the use of mineral acids during pregnancy, by women whose previous children have suffered from umbilical hemorrhage.

374. This is probably the best place for me to introduce some notice of the employment of Anæsthetics in Midwifery, whether in natural labor, or in cases requiring operation.

The two sole agents in use now for the purpose of producing insensibility to pain, are ether and chloroform; but the latter has so far superseded the former, that I may confine my remarks to the use of chloroform.

To my friend, Professor Simpson, belongs the credit of having been the first to administer ether during labor, and also of having discovered the value of chloroform as an anæsthetic, and of introducing it into practice. It is composed of two atoms of carbon, one of hydrogen, and three of chlorine; or one of formyle and three of chlorine, sp. gr. 1·480; it rapidly evaporates, and possesses an aromatic, pungent taste, and a fragrant smell.

When inhaled, it gives rise to exceedingly pleasant sensations, and a rapid flow of thoughts and images, resembling a pleasing dream, until, as the dose is increased, these become confused and incoherent, previous to deep sleep being induced. The first stage is one of excitement, then follows calm sleep, and at length stupor; but the excitement is said to be less than when ether is used.

The beneficial effect is the alleviation of pain, in consequence of, and in proportion to, the amount of insensibility, so that we possess the power of graduating its effects as we may deem advisable.

That injurious effects are occasionally produced, is no more than we should expect from so powerful an agent: that they have occurred in so very small a proportion may well excite our wonder. Almost all the unpleasant symptoms are referrible to the nervous system, such as spasms, twitchings, hysterics, convulsive movements, incoherent talking, etc. Several fatal cases of collapse have been recorded, and although some doubts have been entertained as to whether the death was caused by the chloroform, I fear the evidence is too clear. So far as I can judge, the mode of death is twofold; either a fatal syncope, or a fatal asphyxia being induced. It is remarkable that in most of these cases, I believe, the chloroform was administered, not to relieve pain, but in anticipation of it, as for tooth-drawing, etc. It is of importance to remember that the pulse and respiration afford very accurate indications of the propriety of continuing the inhalation; we should stop instantly if we find the former becoming weak and the latter irregular. In Edinburgh, most reliance is placed upon the state of the respiration; any hesitation or failure demands the instant stoppage of the inhalation.

375. So much for the general use of chloroform; now let us see what has been the result of its employment in midwifery. It has been now used extensively in Great Britain, in America, and on the Continent, and we have an account of many thousand cases in which it has been employed. From this it appears,

1. That in midwifery practice no death has occurred which can be fairly and directly attributed to the chloroform when administered by medical men. In the cases brought forward by Mr. Gream and Dr. Ramsbotham, there is no evidence to prove that the deaths did not result from the circumstances of the labor, and no ground to attribute the accident to this agent.

2. That some unpleasant symptoms have occurred in hysterical and ner-

vous women during the stage of excitement, but no instance of the alarming or even fatal collapse which has occurred in cases unconnected with pregnancy or parturition. These symptoms disappear in a few moments if the chloroform be discontinued, or, as is said, if the dose be increased.

3. In a small proportion of cases, the uterine contractions are weakened, rendered less frequent, or even suspended, so long as inhalation is continued, but that they return if the use of chloroform be discontinued.

4. In the great majority of cases it does not interfere with the labor pains, except by suspending all voluntary exertions, if the insensibility be complete. Where the dose given is milder, although great relief be afforded, the patient will not become insensible, and will be able to exert considerable force.

5. That chloroform, in full doses, is capable of entirely removing the pain of obstetrical operations, and thereby increasing the facility of their performance. Moreover, that the dose can be so graduated as to afford degrees of relief, so that, in natural labor, a certain amount of suffering may be spared without producing insensibility, or incurring the risk, whatever that may be, of a full dose.

6. It neither prevents nor weakens the subsequent contractions of the uterus, and consequently does not render the patient more liable to flooding.

7. That certain women seem more obnoxious to its injurious effects than others, and in some these effects are said to continue some time. Giving full force to these cases, they appear to form a small part of a large number whose recovery was not retarded, and whose subsequent health was uninjured.

These inferences, I think, are fairly deducible from the published cases: whether, as has been asserted, many fatal or bad cases have occurred which have not been recorded, I cannot say; but until we know the particulars, it is clear that we can allow no weight to such a supposition. It is much to be regretted that so much personal and party feeling has entered into the publications on the subject, instead of a simple desire to discover in what cases this new agent is admissible, and in what it ought to be rejected, with the reasons for such decision.

376. It is right, however, to notice respectfully some of the objections which have been made by most experienced and conscientious practitioners.

1. The first objection I shall notice is, that as "in sorrow shalt thou bring forth children" was part of the original curse pronounced upon the sin of man, therefore any attempt to mitigate the suffering is a direct and unwarrantable interference with an ordinance of God. Now it will be remembered that labor ("in the sweat of the brow"), pain, and death were equally the result of the same sin, and inflicted by the same Hand, and yet we never hear of the wickedness of lightening labor, of relieving pain, or of postponing death, each of which *must* be wrong, if relieving the suffering of childbirth be wrong. It is monstrous that one set should claim the privilege of relief, and object to its being extended to the other. If further argument be needed, the reader may refer to Dr. Simpson's critical remarks upon the Hebrew word translated "labor."

2. It has been stated that, in operations, the loss of sensibility deprives the operator of a valuable indication as to whether he is inflicting injury or not. I do not see much force in this objection, I confess. If the operator be skilful, and habituated to the use of instruments, he will not do mischief because the patient does not cry out; and if he be not skilful, her crying out will not prevent him. I am sure that the patient being spared the shocking pain of most operations, and the operator the distress of witnessing it, is a blessing beyond price, and more than anything calculated to secure a safe and skilful performance, and in all probability a favorable convalescence

3. Our ignorance of the bad consequences of chloroform, and of the cases improper for its exhibition, and the consequent probability of our complicating the labor by some serious accident voluntarily incurred, has been, and is yet, I think, an objection deserving of careful consideration. No doubt the increased and increasing number of facts recorded affords a ground for sound conclusions, in proportion to their extent; but it is still to be desired that there should be a careful classification and minute investigation of those cases in which any unpleasant symptoms have occurred, with the object of discovering the circumstances, whatever they may be, which counter-indicate the employment of anæsthetic agents. Interruption of uterine action, diminution of uterine force, and affections of the nervous system, seem to be the chief evil effects to be feared in parturient women.

4. The probability of uterine hemorrhage after labor was formerly much insisted upon, but I think experience has shown that this fear is groundless. It has not occurred more frequently in patients who have used chloroform than in others.[1]

377. Thus far I have given the inferences which appear to me to be fairly deducible from the cases on record, irrespective of the opinions of the various writers who have engaged in the controversy. The following practical conclusions may be regarded as my own opinions, formed after much thought and reading, and after some slight personal experience. I would not wish to put them forth dogmatically, for I do believe that we are not yet in a condition to define accurately, or to speak positively on the subject. I confess that I can neither agree with those who think that chloroform can do no evil, and therefore ought to be used in every case, nor yet with those who regard it as in all cases injurious, and therefore to be reprobated.

1. In most *obstetric operations*, anæsthesia appears to me to be of great use, not so much because it is supposed to relax the soft parts, or to moderate uterine action, as because it enables the patient to bear the additional pain we inflict without outcry or movement. It surely must be a great advantage in performing a dangerous operation that the patient should lie still, and not by her struggles increase our difficulty, and the risk of injury to herself. If the tissues be relaxed, which is doubtful in many cases, it is of course an additional advantage; and if it happened in a case of turning that the uterine action were suspended, of course the operation would be all the more easily completed; but these are rather accidental advantages than essential consequences. In operative midwifery, therefore, chloroform may be given until anæsthesia is produced before commencing, and its effects may be kept up during the operation, *provided* that there be no counter-indication to its use, and that no unpleasant symptoms arise; in either case it should be given up altogether. In the last edition of this work I excepted from the use of chloroform two classes of cases, viz., convulsions and hemorrhage, more from a fear of its being injurious than from any evidence we had of its being so. Since then, the experience of Drs. Channing, Turner, Keith, Norris, Shekleton, etc., has shown that, so far from being mischievous in convulsions, it is most useful as a remedy.[2] And as to hemorrhage I must add, that the fear I feel is one of anticipation, and not founded on experience. Dr. Simpson and others have administered it in placenta prævia, when there has been great loss, without any evil effects.

2. It may be administered with great advantage in certain cases, in which a thorough examination, with the hand introduced into the vagina, is necessary for determining upon the proper line of treatment; as in distortion, for instance, to enable us to determine whether the diameter of the brim is sufficient to enable a living or mutilated child to pass, or whether we must

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[1] British and Foreign Med. Chir. Review, April, 1855, p. 359.

[2] See the Chapter on Convulsions.

have recourse to the crotchet or Cæsarean section. Under the influence of chloroform, we may compare the breadth of our hand across the knuckles with the brim of the pelvis, and arrive at a very accurate measurement, without pain to the patient. This Dr. Simpson tells me he has found very satisfactory.

3. As to its exhibition in *natural labor*, as I do not believe that in the large majority of cases convalescence is at all impeded by the suffering, I cannot see the *necessity*, or even the propriety, of urging the employment of anæsthesia in every case; and I do feel that even greater caution ought to be used than in operative midwifery. We may be justified in running some risk where an important point is to be gained, such as perfect quietness during an operation, which we should not be justified in incurring merely to relieve pain. Thus in hysterical or nervous patients, in those laboring under nervous affections, or organic disease of the lungs or heart, etc., I do not think we ought to employ it.

But on the other hand, as pain is undoubtedly an evil in itself, if there be no counter-indication, and if the suffering be either great or prolonged, I cannot see that we are prohibited from the employment of anæsthetics, more especially as it is not necessary in such cases to produce insensibility. It is quite possible to afford immense relief, to "render the pains quite bearable," as a patient of mine observed, by a dose which does not produce sleep or impair the mental condition of the patient, and which all our experience would show is absolutely free from danger.

In my own practice I have never urged a patient to use chloroform in natural labor, and, on the other hand, I have not felt justified in refusing a moderate dose of it when the patient urgently desired it, and none of the conditions were present which seemed to me to counter-indicate it.

378. The period at which it has been administered varies with different practitioners; some commence before the os uteri is dilated, others about the time the head escapes through it. There can seldom be any necessity for its use, I think, before the os uteri is fully dilatable, and it is more likely to interfere with the uterine action at an earlier than a later period. At the commencement of the second stage would, I should think, be soon enough, and this seems to be Dr. Simpson's practice.

379. There is a difference of opinion as to the extent to which the anæsthesia should be carried. Prof. Simpson prefers inducing complete insensibility at first, and then keeping up just so much of the effect as he deems advisable. Dr. Rigby prefers commencing with smaller doses in natural labor, and increasing them if necessary; and the Obstetric Committee of the American Med. Association, in their Report, agree with this view. Of course, if we are to operate, the patient should be placed thoroughly under the influence of the chloroform before we commence, and its effects kept up by occasional inhalation. But in ordinary cases, as I have said, I prefer beginning with a moderate dose and watching its effects, and, if necessary, increasing the anæsthesia.

The dose should be administered at the beginning of each pain, and increased when the head is passing over the perineum. The anæsthetic state may be kept up for hours without mischief, especially when complete insensibility is not required.

I have tried various modes of administration, instruments specially contrived for the purpose, sponge, lint, etc., and I believe that by far the best is the one originally proposed by Dr. Simpson, viz., a clean white pocket-handkerchief, folded funnel-shape; into which half a drachm or a drachm of the chloroform is to be poured, and which may then be first placed near the mouth of the patient, and after a few respirations, over both mouth and nose. It is a good plan to allow the patient to hold the handkerchief herself, unless we wish to produce deep anæsthesia, as it will fall from her hand when sleep commences.

[The employment of anæsthesia in all cases of labor, as a matter of routine, merely for the purpose of securing to the parturient female freedom from pain, has, it is believed, at present few advocates, while the number of those who are in favor of the practice in certain forms of difficult, tedious, and instrumental labor, is evidently augmenting.

It must be admitted, that, in a very large number of cases of natural labor, anæsthesia has been induced without, apparently, any evil consequences accruing to either mother or child — whether, however, all the instances in which injury has resulted from the practice have been made public we have no means of judging. That so few should have been heard of is really a matter of surprise, considering the powerful influence the several anæsthetic agents necessarily exert upon the nervous system, and the extensive and careless manner in which they have too often been resorted to.

It is true that, in the practice of midwifery, anæsthesia has seldom been carried to the extent of producing entire unconsciousness, and even when inordinate doses of ether or of chloroform have been administered, the patient has been probably saved from any bad effects in consequence of the accoucheur's rashness, by the careless manner in which the agent has been used, causing the greater portion of it to escape into the air of the chamber instead of passing into her lungs.

The time is near at hand when, from a full and honest comparison of facts, the question as to the propriety of employing anæsthesia in obstetric practice will be definitely settled, and the cases and the period of labor, and the extent in which it may be safely and beneficially resorted to, become fixed upon certain and well-established data. Already the ultraism of the early partisans of the practice is rapidly abating, while many of those who at first objected to it, as under all circumstances dangerous, if not positively injurious, are willing to avail themselves of its aid in certain forms of labor.]

CHAPTER IV.

CONVALESCENCE AFTER NATURAL LABOR.

380. THE history of natural labor would be incomplete did we not say something of the state of the patient after delivery, both as to the effects produced, the gradual restoration of the parts engaged, and the requisite treatment.

If we examine the condition of a patient a few hours after delivery, we find a considerable change, both locally and generally, and which cannot be attributed to mere fatigue. The nervous system is more or less affected; the secretions are altered, and new ones established; the condition of the uterine system itself, and in its relations, is completely changed, the circulation disturbed, etc. etc.

Let us briefly examine these peculiarities separately.

381. 1. The *nervous shock.*—The sudden alteration of the eye, the diminished or increased sensibility of the brain, the disturbance of the respiratory

and circulating systems, the modified secretions, the great exhaustion, etc., are all evidences of a shock to the nervous system, the effects of which are thus extensively felt. After easy labors the shock is not very remarkable, and the patient soon recovers from it; but it is too manifest to be doubted after those of a more serious character. I cannot agree with those who attribute the state of the patient to fatigue, and I am happy to have in this opinion the support of the late Professor Hamilton, of Edinburgh, who, in his practical observations, distinctly recognizes this nervous shock as an effect of labor. When it is moderate, it gradually subsides if the patient be kept free from all excitement and disturbance, and obtain a few hours' sleep. In proportion to the rapidity and completeness of its subsidence, will be the return of comfort and health to the patient.

382. 2. The *state of the circulation and respiration.* — The changes induced in these systems appear to be the combined result of the nervous shock and muscular exertion. From extensive investigations I have obtained the following results. During the second stage of labor the pulse (as already noted) always increases in frequency, though the amount varies in different persons. Shortly after delivery it falls, nearly, but not quite, in proportion to its previous frequency; *i. e.*, it descends nearly as much below the ordinary standard as it was above it. After the lapse of a few hours a reaction takes place, the amount of which is nearly, but not quite, in proportion to the original increase and subsequent collapse. Again, after twelve or fourteen hours, it subsides, to be again increased on the secretion of the milk; after which, if the patient go on well, it gradually returns to the ordinary standard. To illustrate my meaning, let us suppose that during the second stage the pulse mounts up to 120; then, during the collapse, it will fall perhaps to 60; and, on reaction taking place, it will rise to 100 or 110. I do not intend to give this illustration as the accurate standard of these changes, but merely as illustrative of the alterations I have generally observed; nor do I say that they occur in every case, but only that I have noticed them in a very large majority. I have never been able to discover any proportion between frequency of pulse induced by the secretion of milk and its previous state. The importance of these successive alternations will be seen more strikingly when we come to consider the variations from normal convalescence; it may suffice to say, that I have seldom seen them absent (the pulse having increased during the second stage) without serious cause.

The frequency of respiration after natural labor is in accordance with that of the pulse, when the nervous shock has been moderate. During the increase of the circulation the number of respirations per minute is increased, and again diminished during the collapse.

383. 3. *State of the uterus, vagina, etc.*—Immediately after delivery the uterus contracts more or less firmly, so as to reduce its size to about that of an infant's head. This contraction is beneficial in several ways: it prevents hemorrhage, it empties the uterine cavity, and diminishes the calibre of the uterine vessels and sinuses. After a short period of contraction an interval of relaxation ensues, followed in its turn by renewed contractions. The repeated contractions and concurrent absorption reduce the size of the uterus gradually, until, about the eighth or tenth day, it is small enough to descend into the pelvis. Previous to this, it can be examined through the relaxed abdominal parietes, and a tolerably accurate knowledge obtained of its condition; but subsequently we can only reach the fundus at the brim of the pelvis; and after another week it disappears altogether. Some, as Murat and Ramsbotham, attribute this rapid diminution in size to uterine contraction alone; others conceive, with Dr. Hamilton, that absorption goes on rapidly at the same time, and recent investigations show that Dr. Hamilton

is right. Dr. Heschl has described the process minutely as a fatty degeneration, and his views confirm those of Dr. Retzius, of Stockholm.

It may be interesting to my readers to have a brief sketch of the changes which take place after delivery, according to the most recent researches, although there are several points which require confirmation and elucidation. According to Dr. Heschl, the fibres of the uterus undergo an entire fatty transformation, commencing between the fourth and eighth day after delivery, and at all points pretty evenly. With the advance of the fatty transformation, the uterus becomes friable, and the tissue surrounding the fibres becomes absorbed, the structure loses its reddish color, and becomes of a dirty yellow. About the fourth week, the uterus having resumed its normal volume, the commencement of a new uterine tissue may be observed; in the body of the organ, and in its outer layer, nuclæi, cells, and finally cells drawn out into fibres, make their appearance, and ultimately become the new uterine substance. As these increase, the old tissue is absorbed, and the process is complete at the end of the second month. During this process going on in the cervix uteri, hemorrhage often occurs, which gives to this portion the ecchymosed appearance mistakenly attributed to the effects of labor. The veins and capillaries undergo a similar transformation.[1]

384. The condition of the cavity of the uterus is of great interest. When examined a day or two after delivery, the lining membrane appears loose and corrugated, somewhat softened, and covered more or less by patches of the decidua. The part to which the placenta was attached is raised above the level of the surrounding parts; its surface is unequal, resembling in this respect a granulating ulcer; its size is wonderfully reduced. The whole internal surface is of a dark ash color, while the discharge upon it may be greenish or brownish, giving the appearance of a morbid condition of the parts—indeed, I have known it pronounced to be gangrene. The structure of the uterus, if cut into, is found to be less dense than natural, and the fibres more distinct; the sinuses are still very evident, and at the placental insertion they are filled with clots of blood. The os and cervix uteri are covered with ecchymoses, as though they had been severely bruised; and sometimes small lacerations may be observed in the margin. The orifice remains open for some days, but gradually closes. According to Dr. Heschl, the placental spot undergoes a fatty transformation similar to the other parts, and a formation of a new uterine substance.

According to Cruveilhier, Fergusson, and others, the mucous membrane is thrown off at delivery, and the muscular fibres left bare; and Dr. Heschl describes its re-formation, but he admits that the matter is not very clear to himself. A few days after delivery the internal surface of the uterus appears covered with a red-colored soft, pap-like, flaky substance, consisting of pavement and cylindrical epithelium, and young cellular substance, in which vessels become evident the third week, and the glands afterwards. Now, I would just observe, that if the mucous membrane is thus exfoliated after labor, it is the only example in the human body of a mucous membrane undergoing the process *physiologically*, and, from the very few observations I have been able to make, I feel inclined to agree with Dr. M. Duncan,[2] that no such exfoliation takes place, except, perhaps, at the insertion of the placenta, and of this I do not feel quite sure. Dr. Duncan examined several cases most carefully, and in none was the uterus denuded of mucous membrane. Of one where death had taken place on the fourth day after delivery, he thus speaks: "The whole inner surface of the organ was manifestly covered by a mucous membrane; lacerated at the site of the placental insertion, a surface between three and four inches in diameter, a number of clots were entangled in the venous openings. Elsewhere the mucous membrane was distinct. It was covered by the lochial secretion. On scraping the surface, the lochia and epithelium were easily removed, laying bare the fibrous structures of the mucous membrane beneath," thus confirming Virchow's observation that the site of the placenta was the only part denuded of mucous membrane. Dr. Chisholm has published two cases analogous to those of Dr. M. Duncan.

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[1] Remarks on the Conduct of the Human Uterus after Delivery, translated by Dr. R. M'Donnel, of Dublin.

[2] Dr. J. M. Duncan on the Internal Surface of the Human Uterus after Delivery. — British and Foreign Med.-Chir. Review, Oct. 1855, p. 506.

The *vagina* is speedily reduced in size after its great distension: at first there is considerable heat and soreness; but this shortly subsides, unless the head of the child have remained long in the pelvis, or the lochia be acrid. The lower outlet, too, resumes its natural capacity in a shorter time than would have been believed possible.

The abdominal integuments are longer in resuming their natural state; they remain flaccid and loose for a considerable time; but if care be taken in the bandaging, but little evidence, beyond the presence of the white streaks, is afforded, after a month or two, of their previous distension.

385. 4. *After-pains.* — The contractions of the uterus, subsequent to delivery, of which we have spoken, are generally unaccompanied by pain in primipara; but in subsequent labors they cause more or less suffering, and are called "after-pains." [As a general rule, it is true that females do not suffer from after-pains subsequent to a first confinement. Exceptions, however, occasionally occur. We have known primiparous women to experience as severe after-pains as those who had previously borne children.] They vary a good deal in their frequency, their severity, and their duration. The first is generally felt within half an hour after delivery, and they ordinarily cease in thirty or forty hours, though they may continue longer. They are not generally accompanied by bearing-down efforts, nor by increased frequency of the pulse. During their presence the discharge from the uterus increases, and coagula are frequently expelled. From this latter circumstance they have been attributed to the presence of coagulated blood in the uterus, but, at most, this is only an occasional exciting cause. Their operation is, within certain limits, undoubtedly salutary; they prevent hemorrhage, diminish the size of the uterus, and expel its contents. The application of the child to the breast often brings on or aggravates the after-pains.

386. 5. *The lochia.*—The discharge of blood which accompanies delivery continues for some time afterwards, doubtless from the mouths of the vessels exposed by the separation of the placenta; but after a while the character of the discharge changes, and it can no longer be considered a mere escape of blood, but exhibits all the characters of a secretion. This state of the lining membrane of the uterus would lead us to expect such an occurrence. The discharge is called the "lochia;" or, in popular language, "the cleansings." For three, four, or five days, it continues of a red color, but much thinner, and more watery than blood, and not coagulable; it then sometimes becomes yellowish, like puriform matter; but more frequently maintaining its serous consistence, it changes its color successively to greenish, yellowish, and lastly to that of soiled water.

It has a very peculiar odor, which can neither be mistaken nor forgotten, but which it is impossible to describe. The duration of the lochia varies a good deal; in some patients it ceases naturally and without bad effects, a few days after delivery, and I have repeatedly observed this with those delivered of still-born or putrid infants. Generally speaking, in these countries it does not cease till about the end of three weeks, or a month; but much depends upon the constitution of the person. As to the quantity, it is impossible to fix any limits; it depends partly upon the extent of secreting surface, and partly upon the duration of the discharge. As the secretion is necessary for uterine health, the sudden interruption of it is generally attended with evil consequences.

387. 6. *The secretions and excretions.*—From the exertions of the second stage of labor the secretion of the skin is increased, so that the surface is bathed in perspiration. After delivery, this active state of the secretion diminishes somewhat, but still continues above the ordinary standard; and very often the perspiration has a faint sickly odor. The skin is soft and flabby, with a slightly greasy feel. As convalescence progresses, the surface returns to its natural state.

The kidneys may retain their usual activity, or, which is more frequent, have it somewhat increased after delivery, notwithstanding the unusual amount of perspiration; but this may be owing to the diet consisting principally of fluid matter.

The state of the bowels varies; sometimes it is unaltered; in others it is the reverse of what it was during gestation, patients who were constipated having now no need of medicine; and those who were annoyed by diarrhœa having solid motions. The latter change is by no means uncommon, and may probably be owing to the increased secretion from the skin and kidneys.

7. *The milk.*—The enlargement of the breasts during gestation is generally accompanied with the secretion of a serous fluid, differing from true milk, though in some cases (seldom with first children) true milk is secreted during labor, and the woman can give suck immediately afterward.

In ordinary cases, however, the breasts remain quiescent for about twenty-four hours, but soon after that begin to enlarge, with stings of pain. At the end of the second or beginning of the third day, they are perceptibly larger, heavier, and more tense; the patient may suffer from rigors, heat of skin, pain and soreness of the breasts, and the pulse is quickened. At this time the secretion commences, at first slowly and with difficulty, but afterwards more freely, and in proportion to the freedom is the diminution of the pain and fever, until, after a few days, it takes place without distress or disturbance. The milk (colostrum), during the first five or six days, differs from that secreted afterwards, and often acts as a purgative to the child.

388. MANAGEMENT OF WOMEN IN CHILDBED.—I cannot do better than follow the order in which I have noted the phenomena of childbed.

In ordinary cases the *shock to the nervous system* does not require any active treatment. The patient should be kept in a state of perfect quiet, the room slightly darkened, and very few persons except the nurse admitted. Little talking should be allowed, and no whispering. Everything calculated to excite mental emotion should be avoided, and the patient be kept calm and cheerful. The horizontal posture should be strictly preserved, and the patient allowed to sleep, after which the nervous system will have recovered its tone, and the patient will be free from danger on this account.

389. As the state of the *pulse* is merely symptomatic, it will be best remedied by our successful management of the patient in other respects. It should be narrowly watched, and accurately estimated, as its deviations will often be the first evidence of mischief going on.

390. Immediately after the expulsion of the after-birth, a warm napkin should be applied *to the vulva*, and changed at short intervals during the day. This will afford relief from the smarting pain consequent upon the passage of the child. After some hours, when the patient is recovered, the external parts should be washed with tepid milk and water, containing a small portion of spirit. This must be repeated twice a day, not only for the sake of cleanliness, but to aid in restoring the parts to their natural state.

A horizontal posture is peculiarly favorable to the general condition of the patient, and especially to the uterine system, in the relaxed state in which it is after delivery; the patient cannot assume an upright position without a certain amount of displacement, and a risk of hemorrhage, or possibly of sudden death. By keeping the patient on her back, we may even remedy old displacements. A lady had prolapsus uteri after her second confinement, which lasted till she became again pregnant; this was mentioned to me when I was called to her in her third labor. I kept her unusually long in bed, and subsequently on a sofa, and the parts completely recovered their natural state, so that she suffered no more from the displacement. In ordinary cases, the *after-pains* require no treatment; but if they should deprive the patient of sleep, we may give an aromatic purgative or a dose of laudanum.

The only attention which the *lochia* require, is, that the napkins should be changed sufficiently often, and applied warm, as any sudden impression of cold to the external parts may be followed by suppression of that discharge.

391. Directions should be given for the patient to void urine within six or eight hours after delivery, or sooner; and this should be done as nearly in the horizontal posture as possible. Owing to the distensible state of the abdominal parietes, the patient will often wait much longer, if not reminded; and the consequences may be very troublesome, if not serious. The bladder may become paralyzed, or inflammation may spread from it to the peritoneum. If there should be any difficulty in evacuating the bladder, as sometimes happens, a cloth wrung out in warm water, and applied to the vulva, will probably remove it; or, if not, we must have recourse to catheterism.

392. The *state of the bowels* after delivery is of great importance; it is, perhaps, better that they should continue quiet for twenty-four or forty-eight hours after delivery; but after that time has elapsed, we should procure a discharge by medicine, if there should be none spontaneously. A dose of castor oil, senna, or rhubarb, may be given, and, if necessary, repeated. The frequency of repetition must be regulated by the state of the bowels previous to labor. If we suspect any accumulation, we should not be satisfied until the intestines are well cleared out; and if the patient do not suckle her child, purgatives will be the more necessary, for the relief of the breasts. In the latter case, the saline purgatives will be found the more useful.

393. The state of the surface will point out the propriety of not exposing the patient to a draught of cold air. She should be allowed to cool gradually, and then the bed and bed-clothes so arranged as to afford a comfortable degree of warmth. The chamber should be kept cool and fresh. The smaller the fire (if there be one) the better.

394. When the breasts begin to enlarge and become painful, relief may be obtained by friction with warm oil or fomentations, at the same time giving a dose of aperient medicine. But the best remedy is the application of the child; and the sooner this is done the better, as the secretion and escape of the milk will be facilitated, the feverishness diminished, if not avoided, and a good nipple more easily formed than when the breasts are distended.

It is better to do this, even if it should not be the intention of the patient to suckle her infant, as it will afford relief; and by not suffering the child to do more, we insure the ultimate subsidence of the secretion, which is always in proportion to the demand upon it: if this be very slight, it will soon cease altogether.

395. The importance of preserving the horizontal posture has already been stated; I shall therefore merely add, that the patient should never leave her bed, even to have it made, before the eighth or ninth day; far

more mischief results from premature exertion than from all the errors in diet added together.

396. The regulation of the diet is, nevertheless, of considerable importance, as excess, by inducing feverishness, may retard the convalescence. The patient should be confined to slops — gruel, panada, arrow-root, milk, whey, weak tea, etc.—with bread or toast and butter, or biscuit, for five or six days. When the excitement produced by the secretion of milk has subsided, if there be no counter-indication, she may take some broth, and on the seventh or eighth day some chicken, or a mutton chop, with some wine and water.

In all that concerns the diet, or the assumption of the upright position, or making exertion, it cannot be too strongly impressed upon all, that an excess of caution is an error on the safe side.

397. ON CERTAIN VARIATIONS FROM ORDINARY CONVALESCENCE. — Although the following observations are a deviation from the plan I proposed, yet I should not feel justified in their omission, and I do not know that a better opportunity will offer for them than the present, as they may be usefully compared with the preceding description of ordinary convalescence. These deviations may depend upon the constitution, or the character of the labor, or upon pressure exercised locally. Even without reference to the influence of the labor, there are certain irregularities which occasion anxiety both to the patient and to her physician. Some of these issue in serious disease; others, more numerous, are mere temporary deviations from the normal course, but requiring familiarity and tact to distinguish them from the more important attacks. Of the more serious affections — such as fatal syncope, puerperal fever, etc. — I shall enter fully in the latter part of this volume.

398. 1. *The nervous shock* may be very severe. In these cases the patient complains of great exhaustion; the senses are either unnaturally dull, or morbidly acute, the breathing is hurried and panting, and the accordance between the respiration and circulation is broken. The aspect of the patient is that of a person in a state of collapse. The countenance is expressive of suffering, anxiety, and oppression. The pulse may be either very slow and labored, or unusually rapid, very small, and fluttering. There are many cases, however, where the shock, though far from being so severe as in the case I have supposed, is quite sufficiently so to excite the fears of the medical attendant. Reaction is long before it occurs, or it may take place imperfectly or excessively, and the patient remain for some time in a very weak condition.

Under proper treatment, the patient will gradually recover from this state of exhaustion or collapse, unless the shock be extreme, and then death may supervene in a few hours. I have seen several cases of this kind; in one case the labor was tedious, but terminated naturally; two others were instrumental deliveries; but in none, where a *post-mortem* examination was obtained, was there either injury or disease discovered. A due estimate of the nervous shock is of great importance in severe cases; for in almost every instance the progress of the convalescence is in inverse proportion to the amount of this disturbance.

The best remedy in these cases is opium, either in a large dose, or in small and repeated ones; it not only gives the patient a chance of sleep, the best restorative of all, but even if it fail in this, the system will be quieted, the respiration rendered more equable, the pulse slower and more natural, and the relation between these two systems restored.

The exhibition of stimulants (wine or brandy, and water) in moderate quantities is necessary; but we must be careful not to exceed, or they will do mischief instead of good. The amount of stimulants given in cases of collapse should have some reference to the probable reaction, as well as to the present state of the patient. Ammonia or musk are the best medicinal stimulants, and they may be combined with the opium. The diet of the patient, when the effects of the shock have subsided, must be nutritious. It may be necessary to postpone the application of the child to the breast for some days, or even to give up sucking altogether in some cases.

All that has been said already upon the necessity of perfect quiet, applies with tenfold force to these cases of extreme nervous shock.

[These remarks of the author are deserving of the serious attention of the young practitioner. "I have seen more than one instance," says Dr. Huston, in a note to a former edition, "in which there was reason to believe the life of the patient was sacrificed from ignorance of the true character of the condition here referred to. If the attention of the practioner be at the time particularly directed to puerperal fever, he is liable to confound the exhaustion in which he finds the patient, with the early stages of that disease. The cold extremities constitute the *chill*, while the haggard countenance, hurried respiration, and frequent pulse, are regarded as conclusive evidence of a rapid peritonitis. Bleeding from the arm or by leeches, is the instant resort, and a few short hours confirm the worst anticipations, by the fatal termination, a result which the efforts of the attendants have but too successfully aided in producing.

"The author speaks vaguely in recommending 'Opium, either in a large dose, or in small and repeated ones.' Where much pain and jactitation occur, the dose should be large, say a grain and a half, or two, or even three grains; but when the object is to soothe the nervous system, and sustain the circulation, small doses, as half a grain or ten or fifteen drops of laudanum, repeated every hour or two, with or without carbonate of ammonia, wine whey, or other mild stimulants, are appropriate remedies. When reaction ensues, of course these are to be laid aside.]

399. 2. *The state of the pulse.*—One variation from the usual alternations of the pulse has just been noted, in cases of great nervous shock, when it either sinks below its due proportion, or more frequently remains very quick, weak, and fluttering, during the period of collapse.

In almost all the cases of flooding after labor, when I have had an opportunity of examining the pulse up to the time of the occurrence, I have found it remain quick, and perhaps full, instead of sinking after delivery. This has been so marked in several cases, that I now never leave a patient so long as this peculiarity remains; and in more than one instance I believe the patient has owed her safety to this precaution. Three cases occurred within a very short time of each other, in which I noted this undue quickness of the pulse without any other untoward symptom; at that time there was no excessive discharge, and the uterus was well contracted. In all these, alarming hemorrhage occurred within an hour, and was with difficulty arrested. I have also remarked an undue frequency of pulse when the after-pains are extremely violent; and as the uterus is in such cases rather tender on pressure, it requires care to distinguish between this state and the commencement of inflammation. This observation will also apply to the quickening of the circulation, which takes place when lactation commences, and which, in addition, is accompanied by rigors. A careful examination, however, will generally lead us to a correct conclusion, and the subsequent diminution of the frequency of the pulse will remove all doubt. Again, the pulse is quickened when a large coagulum is contained in the uterus, or if the patient suffer from diarrhœa, or gastric disturbance. In some of these cases the diagnosis may be obscure, and it may be necessary to suit our treatment rather to the anticipated attack than to the present symptoms;

thus, we may give small doses of blue pill or calomel in combination with opium, along with medicines suited to the peculiar symptoms present.

All the observations I have been able to make confirm Dr. John Clarke's remark, that no patient can be considered safe whose pulse exceeds one hundred.

400. 3. *The state of the uterine system.*—Instead of a gradual decrease in the size of the womb, I have occasionally found on the fifth or six day that its bulk has increased, and that it has felt less firm than previously: this, combined with increased frequency of the pulse, has apparently threatened an attack of hysteritis; nor was this anticipation lessened, by the uncomfortable sensations of the patient, nor by the sudden increase of the lochia. However, in most of these cases, I found upon applying hot fomentations to the abdomen, that more or less coagula were discharged, affording instant relief to the patient, and indicating the source of the symptoms. Purgative enemata also favor the expulsion of the clots; and in such cases may be given with great benefit.

Dr. Simpson has published some interesting observations on the morbid deficiency and morbid excess in the involution of the uterus after delivery, and he has given several cases in which the uterus continued for a considerable time as large as after delivery. It is not the result of any deposit, and the histological characters are those of the pregnant uterus. These cases are not common, but the opposite extreme is still more rare. In one case related by Dr. Simpson, the patient after her confinement suffered from amenorrhœa, anæmia, and diarrhœa, under which she finally sank; and on examination the uterus was diminished one-third below the natural standard.[1] Similar conditions of the uterus had been pointed out by Dr. Montgomery.[2]

It has been already mentioned that the uterus is not free from tenderness in cases where the after-pains are severe; and if it be rudely pressed, the outcry of the patient may lead us to suspect the presence of serious disease. It will be observed, however, that this tenderness is *greatest during each uterine contraction, and that as these contractions subside, the soreness diminishes.*

Fomentations to the abdomen will generally mitigate this sensibility; but if the after-pains be severe, and the tenderness considerable, a full dose of laudanum, followed by an aromatic purgative, will probably relieve both.

The *vagina* may be attacked with inflammation, which sometimes proves extremely distressing; this will form the subject of a separate notice.

In cases where the lochia are acrid, the orifice of the vagina, with the labia and external parts, are apt to be excoriated. The patient may suffer extremely either from a smarting pain, or from itching; and it is difficult to say which is the more distressing. Extreme cleanliness, frequent bathing, lead lotions, black wash, or vaginal injections of warm water, may be tried, and will ordinarily afford relief: if not, the disease will generally subside with the cessation of the lochia.

401. 4. *The after-pains.* — Instead of the after-pains coming on about half an hour or an hour after the labor, in moderate degree, and ceasing after a short time, they occasionally commence immediately after the extrusion of the placenta, with great severity, and long continuance. In these cases the tenderness of the uterus is marked, but when the pain is relieved by remedies, the tenderness disappears also. The pulse, also, is quickened for the time. This deviation does not depend upon the presence of coagula, as in the worst cases I have seen none were expelled, but it seems rather a spasmodic contraction of the uterine fibres. The best remedy is a full dose

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[1] Edin. Monthly Journal, Aug. 1852, p. 127.

[2] Dublin Journal, Nov. 1835. Ibid., vol. xxiii. p. 161.

of opium, which should be repeated if necessary. At the same time hot flannels may be applied to the abdomen and vulva.

The after-pains sometimes continue at intervals unusually long, and are very severe whenever the child is applied to the breast. They occasion distress and exhaustion by preventing sleep, and should therefore be relieved if possible, by cordials, aromatic purgatives, or a dose of opium.

402. 5. *The lochia.*—Variations in the quantity, quality, or odor of the lochia, not unnaturally excite great alarm in the mind of the patient, who regards any deviation in this secretion as a proof of serious disease. Yet very remarkable differences do occur, without any morbid affection of the uterus or vagina.

The discharge may cease a few hours after delivery, especially after the birth of still-born or putrid children, without any unpleasant symptoms.

The discharge may continue the usual time, but in very small quantity; and this is commonly the case when flooding occurs during or after delivery.

On the other hand, it may be excessive, though not prolonged beyond the usual time; or without being excessive, it may continue unusually long. In these cases it may be necessary to allow the patient a better diet, and to give tonics, such as bark, preparations of iron, etc.

In some cases, the lochia, after decreasing in quantity for some time, are suddenly discharged in double quantity, and of a red color, but without coagula. This generally happens when the patient is permitted to sit up too soon. Or it may happen at a later period, in consequence of walking about too much. A little extra rest will, however, suffice to restore the patient to her former state.

Again, the os uteri is sometimes obstructed by a clot, and the lochia are greatly diminished, or perhaps altogether restrained, until the expulsion of the clot affords an exit to the accumulation.

Instead of the usual changes, from red to yellow, or greenish, the red discharge may persist; or after these changes have taken place, the red discharge may return. In these cases it is necessary to be on our guard, as the change may be the precursor of secondary hemorrhage. The patient should be confined to the horizontal position, and clothed very lightly.

The lochia, after going through their ordinary changes, may terminate in uterine leucorrhœa, which may become permanent. This will be best remedied by counter-irritation to the sacrum, and the internal exhibition of copaiba, iron, or ergot of rye.

Again, the unusual color of the lochia may excite alarm. Instead of the transition from red to a pale red, yellowish, or greenish color, they are sometimes a dark brown, and perhaps more tenacious than usual, or acrid, so as to excoriate the vulva.

Lastly, examples occasionally occur where the lochia have a very offensive fœtid odor, occasioning great annoyance both to the patient and her friends. The discharge is generally of a dark color, and often acrid. It may arise from the decomposition of a small portion of the placenta or membranes which were left in the uterus or vagina, or from the putrefaction of coagula. In such cases the vagina should be syringed two or three times a day with warm milk and water, or a very weak solution of chloride of lime.

403. 6. *The bladder.*—"After severe labor," says Dr. Burns, "the neck of the bladder and urethra are sometimes extremely sensible, and the whole of the vulva is tender, and of a deep red color. This is productive of very distressing stranguary, which is occasionally accompanied with a considerable degree of fever. It is long in being removed, but yields at last to a course of gentle laxatives, opiates, and fomentations. Anodyne clysters are of service. An inability to void the urine requires the regular and speedy use of the catheter."

Retention of urine is not very unfrequent after a prolonged first labor. It is distressing, but not dangerous, and I have generally found the bladder resume its functions after seven or eight days; during which catheterism will be necessary once or twice a day. I have no doubt that it results from a slight degree of inflammation, caused by pressure, or from a spasmodic action of the sphincter.

404. 7. *The breasts.*—Variations in the period at which the milk is secreted are common, but of no moment. If the vascular action be excessive, it must be moderated by antiphlogistic remedies, such as tartar emetic, purgatives, fomentations, etc., and by the frequent application of the infant.

If, as in some rare cases, no secretion should take place, the child will require a wet nurse, but the mother will not suffer.

When the nipples are deficient or mal-formed, we must endeavor to draw them out by the breast pump; but if this do not succeed, we must obviate the ill effects of the secretion of milk, by tartar emetic, saline purgatives, fomentations, etc.

CHAPTER V.

PARTURITION.—CLASS II. UNNATURAL OR ABNORMAL LABOR.

ORDER 1. TEDIOUS LABOR.

405. Definition. — The head of the child presents, and the labor is terminated without manual or instrumental assistance, but it is prolonged beyond twenty-four hours, from causes which occasion delay *in the first stage.* The placenta is expelled naturally.

406. Very slight experience is sufficient to show that delay in labor may occur in either the first or second stage, and a more extended observation will prove, 1, that when the delay is excessive, the *relative* duration of the two stages is destroyed, so that they bear no steady proportion to each other; thus, for instance, in a labor of sixty hours, the first stage may occupy fifty-nine, and the second only one, or *vice versâ;* 2, that the effect of a prolonged labor upon the constitution of the patient, depends upon the stage in which the delay occurs: and 3, that delay in the first stage involves *per se* very little if any danger, no matter how tedious it may be, but that delay in the second stage, beyond a comparatively short time, is always of serious import; therefore, the only injury done by a prolonged first stage, is the influence it may have upon the patient during the second stage, by rendering her less tolerant of the constitutional suffering. Although these deductions are not distinctly enunciated by writers on midwifery, yet they appear to be involved in their practical remarks, inasmuch as they distinguish the causes of delay in the first stage from those in the second, as being much less dangerous. The above conclusions, drawn from numerical estimates, and supported practically by high authority, are sufficient, I think, to justify our making the distinction between "tedious" and "powerless" labors to depend upon the stage at which the delay occurs.

407. Statistics. — Unfortunately our best statistical reports only give the entire length of the labor, without distinguishing the stages, so that the first Table I shall give will merely show the frequency of those labors whose duration exceeds twenty-four hours.

Authors.	Total Number of Labors.	Above twenty-four hours.
Dr. Jos. Clarke	10,387	134
Dr. Merriman	2,947	128
Edinburgh Lying-in Hospital . . .	2,452	48
Dr. Maunsell	839	46
Dr. Thomas Beatty	1,182	69
Mr. Lever	4,666	62
Dr. Churchill	1,285	166

Thus in 23,758 cases of labor, we have 653 prolonged beyond twenty-four hours, or nearly 1 in 36.

I may add, that delay is most common among first cases.

408. The following Table is intended to exhibit the relative duration of each stage in labors of twenty-four hours and upwards, in which the delay occurred in the first stage, and the results to the mother and child. The registers of the Western Lying-in Hospital have furnished the data, and as the cases are therein entered under the inspection of Mr. Speedy and myself, I believe they may be depended upon.

Number of Cases.	Duration of Labor.	Length of First Stage.	Length of Second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
5	24	23½	½	favorable.	favorable.
13	24	23	1	"	12 " 1 putrid.
2	24	22	2	"	1 " 1 still-born.
3	25	22 to 24	1 to 3	"	"
1	25	19	6	"	"
2	25	17	8	"	"
2	25	16	9	"	1 " 1 still-born.
1	26	25½	½	"	"
7	26	25	1	"	6 " 1 still-born.
2	26	23	3	"	"
3	27	26½	½	"	"
2	27	26	1	"	"
1	28	27½	½	"	"
3	28	27	1	"	"
2	28	26	2	"	"
1	28	25	3	"	"
1	28	22	6	"	"
1	29	28½	½	"	"
2	29	28	1	"	"
2	29	27	2	"	"
1	30	29½	½	"	"
2	30	29	1	"	"
1	30	28	2	"	"
1	30	26	4	"	"
1	30	23	7	"	"
1	30	19	11	"	"
2	31	30	1	"	"
2	31	29	2	"	"
1	31	27½	3½	"	"
1	31	27	4	"	"
1	32	31½	½	"	"
4	32	31	1	"	"
1	32	24	8	"	unfavorable.
1	33	32½	½	"	favorable.
1	33	32	1	"	"

Number of Cases.	Duration of Labor.	Length of First Stage.	Length of Second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
1	33	31	2	favorable.	favorable.
1	34	33	1	"	"
1	34	30	4	"	"
1	34	29	5	"	"
1	35	34½	½	"	"
2	35	33	2	"	"
2	36	35½	½	"	"
1	36	35	1	"	"
1	36	33	3	"	"
1	36	31	5	"	"
1	37	36½	½	"	"
1	37	32	5	"	"
2	38	37	1	"	"
2	38	34	4	"	"
1	39	38½	½	"	"
1	39	35	4	"	"
2	40	39¾	¼	"	1 " 1 dead.
1	41	39	2	"	dead.
1	41	33	8	"	favorable.
1	42	41¾	¼	"	"
1	43	41	2	"	"
1	44	26	18	"	"
2	45	44	1	"	"
1	45	44½	½	"	"
1	46	36	10	"	"
1	47	43	4	"	"
1	48	47	1	"	"
1	48	44	4	"	"
1	48	34	14	"	"
1	49	38½	½	"	"
1	49	46	3	"	"
1	49	41	8	"	dead.
1	50	49½	½	"	favorable.
1	50	49	1	"	"
1	51	50	1	"	"
1	51	48	3	"	"
1	52	48	4	"	"
1	53	52¼	¾	"	"
1	53	52	1	"	"
1	53	46	7	"	"
1	54	53½	½	"	"
1	54	53	1	"	"
1	54	33	21	"	"
1	55	54½	½	"	"
1	57	56½	½	"	"
1	57	56	1	"	"
2	57	53	4	"	"
1	58	57	1	"	"
1	59	57	2	"	dead.
1	59	55	4	"	favorable.
1	60	59½	½	"	"
1	66	62	4	"	"
1	69	63	6	"	"
1	74	72	2	"	"
1	74	73¾	¼	"	"
1	76	71	5	"	"
1	78	72	6	"	"
1	96	66	30	"	dead.
1	100	84	16	"	favorable.
1	103	74	29	"	"
1	177	176	1	"	"

409. Some apology may be due for the length of this Table, and I trust it will be found in the fact that, at least as far as I know, it is the only one of the kind on record. The reader will understand that from this list I have excluded all presentations but the head, all operative cases, all cases which were prolonged in the second stage, and all such as were of doubtful accuracy, but that beyond this I have in no degree selected the cases. The entire number amounts to one hundred and forty-three. Of these not one of the mothers died, although in some cases the first stage was enormously prolonged, and but ten of the children, one of which was putrid. If the relative length of the stages be examined, it will be found that it did not follow, because the first was very long, that the second should be long also; and in many cases (not included in the Table) when the second stage was delayed, the first was extremely short. Thus I think that, so far as it goes, this Table proves the propositions with which I started; viz., that "when the delay is excessive, the relative duration of the two stages is destroyed, so that they bear no steady proportion to each other," and that "delay in the first stage involves very little if any danger, no matter how tedious it may be."

The only apparent exceptions to this rule, of which I am aware, are those cases in which some mechanical impediment exists, and which belong to an order to be hereafter considered. In these cases mischief arises, not from the prolonged first stage so much as from the impediment to the completion of the second; and 2, certain cases in which, from some peculiar irritability of constitution, prolonged suffering in the first stage disposes the patient to "powerless labor" in the second. In such, the uterine power becomes exhausted, and the pains, instead of increasing when the obstacle is removed, gradually diminish in force, and without any mechanical cause, the labor may be indefinitely prolonged, and constitutional symptoms set in. Such cases are, however, comparatively rare. Moreover, a prolonged first stage is a bad preparation for undue prolongation, or for any accidental complication of the second.

These conclusions I think are fairly deducible from the premises, but there are others which I would guard against, and these are, first, that because no evil happened in these cases, therefore nothing is to be done in any case where the delay is in the first stage; and secondly, that the delay was the result of bad management, whereas in most cases the patients were not brought under our care until the greater part of the time had elapsed. I do think that when we find no evil resulting from the delay, we are not warranted in too active interference; but I am equally convinced that when we can remove the cause of it, we are bound to do so.

I may add, in confirmation of my own conclusions, the statement of Denman, "that neither mother nor child is ever in any danger (except in hemorrhage or convulsions) on account of the labor, before the membranes are broken," *i. e.*, in the first stage.

410. SYMPTOMS.—I conclude, then, that these cases of labors prolonged in the first stage, present nothing formidable as regards the mother, and very little as regards the child; but yet we find that the continued suffering produces a great degree of fatigue, and in nervous women especially, the loss of sleep is very much felt; the spirits are depressed, and the patient expresses a great dread of the result. Notwithstanding this, however, the condition of the patient is favorable. The skin is cool, the pulse quiet, the tongue clean and moist; there is rarely any headache; the stomach may be more or less disturbed, but the other bodily functions are performed in a healthy manner. The pains recur regularly, though their extent is often limited, and their power inefficient, their duration and frequency varying occasionally. Still, a perceptible though slow progress is made.

The strength is seldom impaired, and the patient often gets some quiet sleep, which tranquillizes the mind, and restores the bodily powers; there is neither fever nor inflammation, the vagina is cool and moist, and both urine and fæces are evacuated easily and spontaneously.

The tranquil pulse, cool skin, and loud outcry, are all indicative of the first stage of labor, and on examination, the head is found not to have passed through the os uteri, whether or not the membranes be broken.

The nervous shock is never in proportion to the length of the first stage of labor, but of the second.

411. CAUSES AND TREATMENT. — The causes which occasion delay in the first stage of labor are various, and not always peculiar or confined to it, and the treatment must be adapted to each. No doubt can be entertained of the propriety of removing them, when this can be done, even though the delay they occasion may be innoxious. Let us examine the principal causes and their treatment separately.

412. 1. *Inefficient action of the uterus* is a very common cause of delay, and occurs most commonly in delicate women confined for the first time. It may arise from constitutional weakness, a deranged state of the digestive organs, mental depression, uterine plethora, or irritation of the os and cervix uteri, etc.

[It not unfrequently occurs in women who present no striking indications of delicacy, but rather the reverse, and who are not known to labor under any constitutional weakness. The inefficient uterine action in these cases results, apparently, from some constitutional peculiarity—and often descends from mother to daughter. The females of some families are, on the other hand, remarkable for the ease with which they give birth to their children, independently of any physical peculiarity discoverable on the closest scrutiny.]

I have also found that when from any cause (diarrhœa, for example,) the labor is precipitated a few days before the time, the first stage is a tedious one, and also with the first child in cases of twins. It may also happen that when the patient is attacked by false pains (producing no effect upon the os uteri) these may run on into real pains with a prolonged first stage in consequence.

We find the pains feeble, of short duration, limited in extent, often seated in front, and producing little effect upon the bag of membranes or cervix uteri. When the intestinal canal is deranged, they are mixed up with griping pains in the abdomen, which in many cases modify or supersede the real pains.

It should also be stated that bodily weakness or even the presence of fatal disease does not always involve feeble uterine effort; patients in the last stage of consumption are often delivered with great facility.

413. *Treatment.*—The first element in the management of these cases is time. We must exercise patience ourselves, and encourage our patient to do so. All that is calculated to cheer her should be communicated, and she should be occupied, if possible, and amused. If it be day-time, she should not lie down, but may rest on a sofa, and walk about occasionally, taking the pains sitting or standing. The bowels must be freed by medicine, if necessary, and for this purpose enemata of a stimulating character may be used, as they very often also quicken the uterine action. The diet should be bland and nourishing, but not stimulating.

These palliative measures will be sufficient in many cases, in others they are of no use, and the patient may be exhausted from the prolonged suffering and want of sleep; and the best thing we can then do (if there be no counter-indication) is to give a full dose of opium, so as to suspend the pains for a time and procure sleep. If it succeed, the patient will wake up refreshed and strengthened, and the pains most probably return with increased strength. In some cases the inefficient uterine action seems due to some excess of uterine irritability, and in such cases I have found the opium of great use; and the pains, instead of being suspended, increased in force and efficiency. Perhaps this may explain the success which Dr. Soma states that he obtained from the exhibition of belladonna, without attributing to that drug any special power of increasing the uterine action. A purgative enema, administered when the patient awakes, is often of great service.

When the inefficiency of the pains depends on intestinal disturbance, it will be right to evacuate the bowels freely before the opiate be given, if one be necessary. Should there be indigestible matter in the stomach, it is probable that it will be evacuated spontaneously.

In cases of plethora of the uterus, or irritation of the cervix, we shall often derive benefit from the abstraction of blood, after which the pains generally become stronger; if they do not, we may have recourse to the opium for temporary relief.

414. So far the remedies mentioned tend merely to the removal of obstructions to uterine action; but as it does not follow that in all cases this relief is followed by vigorous action, we have next to seek for some agents which shall act directly upon the uterus. The one upon which most reliance is placed is the *ergot of rye*. This vegetable substance appears to have been known for a long period in Germany, under the name of Rockenmutter, Mutterkorn, etc., and to have entered into the composition of various nostrums for hastening labor. It is mentioned by Camerarius in the Actes des Curieux de la Nature for 1668; and in 1777 Desgranges published his first researches upon it, in the Gazette de Santé. Its introduction into British practice was, I believe, owing to Drs. Stearn and Chapman, of New York, whose favorable experience of its effects has been tested by many practitioners, and apparently with different results. [The attention of the profession was first called to this article by Dr. Stearns of the State of New York, in a letter addressed to Dr. Ackerly, in the year 1807; and in the year 1813, attention was further directed to it by Dr. Prescott, in a letter which he read before the Massachusetts Medical Society. Subsequently the high authority of Dr. Dewees has served to bring it extensively into practice—too much so it is to be feared for the credit of the profession and the interests of humanity.] Desormeaux, Lachapelle, Beclard, Capuron, Jackson, Hall, etc., deny that it has any effect at all; on the other hand, we have the authority of Bordot, Chevreuil, Gendrin, Bigeschi, Luroth, Davies, Blundell, Jewel, Smith, and many others, in stating that it is effective and beneficial. From repeated trials, I can bear witness to its efficacy, though it is somewhat irregularly exerted; but I must add that I have seen it do mischief.

The substance itself, according to Decandolle, "is a peculiar species of fungus which attacks the ovary of grasses, and protrudes from them in a lengthened form, especially from rye;" hence the popular term, "spurred rye."

[Recently, Mr. Smith,[1] and Mr. Quekett,[2] have maintained that the ergot is not, properly speaking, itself a fungus, but rather a diseased state of the grain occasioned by the presence of a fungus; to this fungus Mr. Quekett gives the name *Ergotœtia abortans*. By the microscope, sporules, sporidia, or jointed bodies, are discovered, which appear to be the reproductive particles of the fungus.[3]]

It is an oblong, slightly curved grain, about as thick, and twice as long as a grain of wheat, of a dark-brown color externally, but lighter, and with a shade of pink, internally. It has been analyzed by Vauquelin and Wright. The latter chemist states its component parts as follows:

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[1] [Transactions of the Linnean Society of London, part xviii. p. 449, London, 1840.]

[2] [London Lancet, June 22, 1839.]

[3] [Dunglison's New Remedies, 3d edition, p. 431.]

A thick white oil	31·00 grains
Ozmazone	5·50 "
Mucilage	9·00 "
Gluten	7·00 "
Fungin	11·40 "
Coloring matter	3·50 "
Fecula	26·00 "
Salts	3·10 "
Loss	3·50 "
	100· "

The chemical analysis of ergot has thrown but little light upon its active principle as yet, for none of its component principles produce the same effect as the substance administered entire.

It may be exhibited in various ways; that which I have found most certain, is to mix the bruised or powdered grain with a little water or milk, and simmer it for a few minutes over the fire, then give the grounds along with the fluid. Both vinous and acetous tinctures have been prepared, but I have not found them as effectual as the powder. Mr. Battley has also a "liquor sécalis cornuti," which seems more certain than the tinctures; and I have also tried an extract which succeeded pretty well. From fifteen grains to a scruple of the powder, half a drachm to a drachm of the tincture, and from five to ten grains of the extract, may be given every twenty minutes, until the effect be produced, or until we are satisfied that it will not act. I would not give more than a drachm, or at the utmost a drachm and a half of the powder (or its equivalent in tincture or extract); for if that do no good, more will be useless and may be injurious. If it succeed, we find in five or ten minutes after its exhibition that the pains are stronger, longer, and more frequent; their increased frequency, indeed, is often remarkable, even when their force is but little augmented. I have noticed, that shortly after an effective dose has been taken, the pulse becomes slower until after the pain is over, but that ultimately it remains quicker. Besides this power of strengthening feeble pains, the researches of Dr. F. Ramsbotham and others have proved it capable of *originating* uterine action.

415. So far we have spoken of its beneficial effects; and although in by far the majority of cases no injury is produced by it, yet in five or six cases I have witnessed cerebral disturbance in different degrees, from a severe headache up to delirium, coma, and insensibility, follow its use. By others, it is said to disorder the stomach, and if given in large doses, to cause gangrene; but such cases must be very rare. I think I have seen retention of the placenta, from irregular uterine contraction after the birth of the child, fairly attributable to it.

By Girardin, Burns, Moreau, and others, the child is stated to be more frequently still-born after the use of ergot, either from some poisonous influence indirectly exerted upon it, or by the greater pressure of the uterus upon the cord. I have seen some cases confirmatory of this statement, and of the latter mode of explanation, as the uterine action was almost incessant. Dr. F. H. Ramsbotham's cases rather support this view, for he states that when the ergot did not bring on uterine contractions, no bad effects were produced upon the fœtus. Dr. Beatty has published a very interesting paper, showing that in certain cases the ergot does exert a poisonous effect upon the fœtus, and he concludes that the child is not safe unless the labor be concluded within two hours from the administration of the ergot. More recent observations seem to confirm this view.

416. From what has been said, we may conclude that ergot of rye may be tried, 1, when the pains are feeble and inefficient, without especial cause; 2, if the os uteri be soft and dilatable; 3, if there be no obstacle to a natural delivery; 4, if the head or breech present, and be sufficiently advanced; and 5, if there be no threatening head symptoms, nor excessive general irritability.

But on the other hand, it should not be given: 1, if the os uteri be hard and rigid; 2, if the presentation be beyond reach; 3, if there be a malpresentation; 4, if the pelvis be deformed; 5, if there be any serious obstacle to delivery in the soft parts; and, 6, if there be head symptoms, or much general irritation.

Though in some cases, when timely administered, it may anticipate the use of the forceps at a later period, it is not likely, as some have supposed, ever to supersede the use of that instrument, and it is not suited in those cases in which the crotchet is required.

[Of the power of ergot to excite uterine contractions there can be no doubt; but that it often fails to do so under circumstances apparently favorable for its action, will be admitted by all who have had much experience with it. Why this is so, we know not. Very generally it will be found to act with decided energy in cases where the parturient action of the womb has already commenced increasing this action in force, and rendering it more continuous. In this country its *too* extensive employment has left no doubt on this point. The only questions which remain to be settled are as to the circumstances under which it is proper to be used, the dose, and mode of administration. The experience of Dr. Huston, as he states in a note to a former edition, confirms the observations of Drs. Patterson and Ramsbotham, as to its power of bringing on premature labor, and its fatal influence on the child when employed for that purpose, although he "cannot admit that this occurs in consequence of the child being poisoned by the ergot through the system of the mother." Consequently, it should never be administered previously to the setting in of labor, and even then only with the greatest caution, at the proper period, and under the most favorable circumstances for its use.

The *incessant* action of the uterus, under the influence of ergot, is very unlike the *intermittent* contractions which occur in natural labor. This state of permanent contraction of the organ either detaches the placenta, or so compresses it as to destroy its functions before the child is in a situation to respire. The appearance of the children born under these circumstances confirms this statement.

The intelligent practitioners of this city use the ergot chiefly in the advanced stage of labor, or after the birth of the child, to overcome uterine inertia. They always avoid its administration where any obstruction or great disproportion between the size of the child and the passages of the mother exists. It is a rule with them also to abstain from its employment until the os uteri is not only *dilatable*, but *fully dilated*, and the other soft parts in a favorable state of relaxation. Even when thus cautiously had recourse to, the child will not unfrequently be dead-born.

The *dose* given is from one to two scruples of the powder, or an amount of the article equal to that, whatever may be the preparation employed. Some prefer smaller doses, as ten or fifteen grains, repeated every fifteen or twenty minutes until the desired effect is produced.

Some practitioners always administer the powder in the form of electuary, or diffused in water. The best mode of giving the ergot is, perhaps, *re-*

cently powdered, in *hot* water, in doses of a scruple every twenty minutes, until a drachm is taken, unless the proper effect occurs sooner: more than that quantity is never required, if the article be good, and the case one adapted to its use.

Experience has shown that ergot, especially when powdered, rapidly deteriorates; — to avoid this and at the same time furnish an article in a convenient form for immediate use, the Pharmacopœia of the U. S. prescribes a *wine* made by macerating two ounces of the ergot (bruised) in a pint of wine, of which one or two drachms are given at a time, and repeated if necessary.

The oil, tincture, and extract, are rarely used.]

417. Borax is said by German writers to have the power of quickening uterine action, though it is seldom used in this country. Dr. Rigby says, "We have combined these two medicines (ergot and borax) with the best effects, and generally give them in the following manner; ℞ Secalis Cornuti ℈i—ij; Sodæ subbarat. gr. x; Aq. Cinnamomi ℥iss. M. fiat haustus. Cinnamon, which is a remedy of considerable antiquity, has also a similar action upon the uterus, although to a less degree."

418. At a meeting of the Edinburgh Obstetrical Society, Dr. Simpson mentioned that he had tried the Indian hemp, and found that uterine action seemed to be markedly and directly increased by it, but that his experiments were too few to be decisive.[1] I have never given it for this purpose, but it seems worthy of a further trial. Dr. Grigor, of Nairn, has since tried it in sixteen cases; in nine there was no perceptible increase of uterine action, but in seven it succeeded very well, without any anæsthetic or unpleasant effects.[2] Dr. A. Christison tried it in seven cases[3] successfully.

419. Dr. Maguire mentioned to me that he had tried a drop of Croton oil as an oxytoxic, and that it succeeded admirably, whether it acted upon the bowels or not; it did so in the only case in which I have had an opportunity of trying it, but it left a very unpleasant sensation of heat in the throat.

Dr. Harris, of Alabama, has recently stated that a strong decoction of the Uva Ursi has produced the same effect in five cases, without any unpleasant symptoms.[4]

420. Dr. Radford, of Manchester, has lately proposed the application of galvanism in tedious labor from want of power in the uterus, in accidental hemorrhage, irregular contraction, and to bring on premature labor, and he relates a case of hemorrhage in which he employed it successfully, and another in which the pains had ceased. Professor Simpson tried it in eight cases of protracted labor, and thus sums up the results:—"In one instance, the pains were more frequent in their occurrence, but shorter in their duration, during the application of the galvanism. In five other cases, the employment of the galvanism neither increased the average frequency of the pains, nor their average duration. In one, the pains ceased while the galvanism was applied, and returned upon its removal. In another the uterine action ceased while the galvanism was applied, and did not return for twenty-four hours afterwards." In Mr. Houghton's excellent paper, I find it stated that Mr. Dorrington used it successfully in five cases; Mr. Clarke in two;[5] Mr. Cleveland in one; and Mr. Dempsey in ten cases. Mr. Houghton himself succeeded admirably in five cases.[6] Thus the effects have been decided in twenty-five cases, equivocal in one, negative in seven, out of thirty-three cases, which is, I think, amply sufficient to justify a further trial.

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[1] Ed. Monthly Journal, July, 1850, p. 91.

[2] Ibid., Aug. 1852, p. 124.

[3] Ibid., Aug. 1851.

[4] Philadelphia Med. Examiner, Nov. 1853, p. 727.

[5] Dublin Hosp. Gazette, March 1st, 1845.

[6] Dublin Quarterly Journ., Feb. 1852.

421. M. Kiwisch states that he has found the water douche of great use in stimulating the uterus to action. M. Paul Dubois relates one case in which he tried it; and with sufficient benefit, I think, to justify our repeating the trial.[1]

Dr. Washington relates that he has found dry cupping to the sacrum effective in augmenting uterine action. The first class should first be applied to the lowest point of the sacrum, and after about ten minutes, another higher up.[2] I have had no opportunity of testing this, but it does not appear to me unlikely that such an effect might be produced.

I have already alluded to the beneficial effects of stimulating purgative enemata; and I may add that some writers have recommended stimulants externally, such as mustard poultices, or friction with stimulating liniments. I have never found them of any use.

[Labor is occasionally rendered tedious, during its first stage, by the occurrence of irregular and spasmodic pains. "They are recognized," says Dr. Lever,[3] "by their acuteness, by the want of consentaneous action in the uterine fibres — some portion of the uterus, during their continuance, being hard and contracted, while the other portion is soft and yielding; there is also no distinct or regular interval of time between the paroxysms of pain. If untreated or unrelieved, the strength of the patient is exhausted before the establishment of true labor pain; or, the child, which at the commencement presented normally with the head, may even have its position changed to that of the shoulder, in consequence of the uterus contracting on one side only, and thus forcing its contents over to the uncontracting or yielding side. In such cases, the utility and value of opium are most marked. It may be exhibited by the mouth or per anum. It will calm the spasm, subdue irregular action, alleviate pain, procure sleep; and after this, true and regular uterine action will be established. Manifold are the instances of its value I have witnessed under such circumstances."]

422. 2. *Undilatable os uteri.* — In order to put the reader in full possession of all that concerns rigidity of the cervix uteri, I shall have to transgress the strict limits of this chapter, and include a class of cases which in their effects more properly belong to the chapter on Obstructed Labors. The large majority of cases of right cervix offer resistance in the first stage only; *i. e.*, they yield before any symptoms "of powerless labor" set in, but a small number resist permanently. Anatomically speaking, the labor is still in the first stage, for the head is within the os uteri; but virtually, taking the symptoms as a standard, they run on into the second stage, of which they exhibit all the characteristics.

Trusting that the advantage of having the whole subject under view at once may compensate for the irregularity, I shall first speak of the ordinary class of cases. With the first child the cervix uteri is more unyielding than subsequently, and also in women of advanced age. It may give way, however, within a reasonable time; but in some cases it does not, and on examination we find the lips thin, hard, and rigid, or soft, semi-pulpy, or œdematous, and that little progress in dilatation is made during each pain. The pains themselves may be frequent, and very severe, notwithstanding the slight effects they appear to produce. The thick pulp or œdematous cervix uteri is carefully to be distinguished from the soft and flabby condition, which is a kind of transition state in the ordinary process of dilatation, and into which the thin and rigid cervix must pass before it will dilate. The pulpy œdematous cervix is as undilatable as the thin and hard. The latter is more frequent in primipara; the former occurs indifferently, and appears to be the result of irritation, caused in some cases, doubtless, by too frequent examination.

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[1] Moniteur des Hôpitaux, 12th Feb. 1853.

[2] Association Journal, May 27th, 1853, p. 469.

[3] [Op. cit.]

423. *Treatment.* — Several remedies have undoubted power in most cases of this kind, and a suitable selection of them should be tried before we conclude that further interference will be necessary. In fact, the failure of these is in many cases the only test we have whether the rigidity be such as will yield or will resist.

The first, and perhaps the most effectual, when the patient can bear it, is loss of blood. Some caution is necessary, not to carry it to too great an extent; but, within reasonable limits, we need not fear any ill effect upon the patient or the progress of the labor. Dr. Dewees recommends it even with delicate women; in one case he took away two quarts of blood, and the patient did well. Dr. Davis has taken between thirty and forty ounces; but it will not in general be necessary to abstract so much. Neither ought we in any case to bleed in anticipation of the difficulty, as has been advised.

In most cases of rigidity, fourteen or sixteen ounces rapidly taken from an ample orifice in the arm will be sufficient, and if it make the patient feel faint, so much the better; after which, if she be much fatigued, rest may be procured by means of an opiate; and this will generally be succeeded by a softened, yielding condition of the parts.

424. Should the venesection only partially succeed, however, or in case it be not desirable to have recourse to it, we may then try the tartar emetic, which I believe was first used in these cases by Dr. Every Kennedy, of this city. It is an exceedingly valuable remedy, perfectly safe, and very successful. It should be given in small doses, so as to excite and keep up a state of nausea, and it may be advantageously combined with a purgative, — take for instance the following formula: ℞. Magnes. Sulph. ℥j; Infus. Sennæ ℥viiss; Antim. Tart. gr. iij; Syr. Zinzib. ℥ss. M. capiat cochlearia duo omni semihorâ, vel omni horâ. Dr. Hall, of Montreal,[1] recommends larger doses, a grain every half hour; but this I have never found necessary, and I can conceive cases in which much depression and prolonged vomiting might be very injurious.

Emetics were recommended by Lowder, and by many others since his time, founded on the observation, that the spontaneous vomiting in labor is almost always followed by relaxation of the os uteri; but as the same benefit results from exciting nausea, it is much better to avoid the shock of vomiting.

Opium has been used to suspend uterine action; but it is far more effective when given after bleeding. Tobacco enemata have been proposed and tried; but their effects are so uncertain and occasionally so formidable, that their use is hazardous, and to be deprecated. Dr. Dewees says that they do not succeed in softening the cervix.

425. Belladonna was recommended by Chaussier, from its effects in relaxing sphincters: but there are very serious objections against its use. Dr. Rigby states, "for our own part we must confess, that although we have seen this application tried repeatedly, it has never produced the desired effects; but has invariably brought on very troublesome and distressing symptoms, such as sickness, faintness, headache, vertigo," etc.

French practitioners are in the habit of using mucilaginous injections, after the recommendation of Gardien, nor is there any objection to them, although I cannot say I have seen much good from them. The hip-bath was tried by Dr. Dewees, but without adequate benefit; it weakens the patient, and may possibly give rise to hemorrhage.

["In practice," remarks Dr. Lever,[2] "we find women, who have suffered in early or unmarried life from one or other of the forms of dysmenorrhœa, when pregnant and in labor, with the os uteri thin, sharp, knife-life, so that its edge is scarcely to be felt—in fact, is often overlooked by the unpractised finger. The sufferings of the patient are intense; the dilating stage of labor is protracted; and, if untreated or unrelieved, by the time the os uteri is dilated nature is exhausted, uterine efforts fail, and such a case is frequently terminated either by the forceps or by craniotomy. In most cases, these evils may be averted by the timely employment of opium, and the best mode of securing its good office is in the form of enema.

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[1] British American Journal, Dec. 1850.

[2] [Lond. Med. Gaz., Nov. 1849.]

"We occasionally find the first stages of labor rendered tedious by a hardened, undilatable condition of the os uteri, in women who have suffered from chronic inflammation of the neck of the uterus, or those who have worn mechanical contrivances for the purpose of supporting the viscus, and in those who, from disease, imaginary or real, have been submitted to the influence of some escharotic, at the present day by far too commonly practised. This condition of the os uteri needs no description; the sufferings of the patient are excessive and protracted, and, if unrelieved, may be followed by results serious to mother, and fatal to child. In addition to blood-letting, applicable to some cases, to the warm bath, of immense value, to the exhibition of antimony, and this is of the greatest service, we find, when the latter has been exhibited, and has produced its desired results, relaxation of the os uteri, and increase of discharge, that opium, given in a full dose, will render these permanent, and thus prove a most valuable agent in completing a safe delivery.

"Opium has been recommended most strongly in cases where the os uteri is callous; but if the callosity depends upon previous injury, or is the result of disease, its value, in my opinion, depends upon its power to curb uterine action until vaginal interference removes the obstruction to the passage of the fœtus. But there is another condition of the os uteri in which opium acts, and like a charm:—in women who have suffered from irritable uterus, where the vagina is generally dry and hot, although not over-sensitive; but the moment the examining finger touches the os uteri, the patient shrieks out, shrinks from the attendant, and by her cries and motions evinces the sufferings she endures. In addition to subsidiary measures, as the warm bath, the injection of linseed tea into the vagina, great benefit is to be derived from the use of opium, either by the mouth or by the rectum; the latter mode of employment being the one I prefer."]

426. I believe we shall rarely fail in softening the more simple cases of rigidity by some one or other of these means; and it may be a great question how far any manual or digital interference for the purpose of dilating the os uteri is admissible. Dr. Smellie both recommended and practised it; Drs. Hamilton and Burns advocate it, and also the present able Professor of Midwifery in Edinburgh.

On the other hand, Dr. Murphy, and almost all the English authorities, Dr. Collins and all the Irish, object to any mechanical interference whatever. I think some confusion has arisen from the uncertainty of the amount of force or dilating power to be employed. If this be much, we have evidence enough that it may do injury; if it be little, will it suffice? That a certain amount of dilatation may be effected without injury by passing the finger along the borders of the os uteri, with a very moderate degree of pressure, I know, because in some of the more obstinate cases of simple rigidity I have tried it; and I know also that the pulp of the forefinger, placed firmly at the edge of the cervix during a pain, without any attempt to dilate, seems to favor dilatation by giving a point of resistance in those cases, especially where the pelvis is large. More than this I would not venture to recommend, although it has been practised with benefit;[1] but this much is safe, and may be very serviceable.

427. But now let us speak of those more obstinate cases of rigidity in which all these remedies have failed after a fair trial, and the failure of which points out that they belong to a separate class, and that other means must be employed.

The rigidity in some of these cases appears to be owing to a natural density of structure; in another and larger class, to be the result of inflammation following previous labor, or disease or violence. There is also a small class in which it results from organic disease of the cervix.

In these cases the pains may continue strong and frequent, increasing in force, and assuming the characters of second-stage pains, with voluntary efforts superadded. After a while the pulse becomes permanently quick, the skin hot and sweating, the face flushed, and meantime no progress is made in the dilatation of the os uteri, the cervix feels hard and tight, and the head, covered by the cervix, is forced down into the pelvis, if it be sufficiently spacious.

The remedies which act so beneficially in the simpler cases seem to have no effect here, and if relief be not afforded, the case gradually assumes the character of powerless labor, with or without complication.

Now, what is the result if the case be trusted to nature? It may terminate in various ways, all of them very serious.

1. The patient may become utterly exhausted, and die, as in powerless labor, or be carried off by a convulsion before delivery. This happened with one of Smellie's[2] cases.

2. In cases where the pains are vigorous, the cervix uteri, in part, or entire, has been torn off. Such cases are recorded by Mr. Scott,[3] M. Steidelè, Dr. E. Kennedy,[4] Mr. Power,[5] Dr. Lever,[6] Dr. Davis, Dr. Reardon, Dr. Johnston,[7] and I have seen two myself. These cases, though involving some danger, do not generally prove fatal.

3. Rupture of the cervix may occur spontaneously, and if confined to the cervix, and the pains be good, and the patient not too much exhausted, may terminate successfully; but if the labor have been much prolonged, assistance may be required, and the patient may sink. Dr. F. Ramsbotham relates two fatal cases of this kind.[8]

4. Rupture of the body of the uterus is by no means unfrequent, and of course proves fatal. Several examples of this have been recorded, and are collected in Dr. Trask's paper. In addition to the fearful mortality as regards the mother, I may mention that nearly all the infants are lost.

5. Let me add that, if delivery have been effected by craniotomy, the patient may have sunk so much by the previous long labor, that she may survive but a short time. One of Smellie's cases died in twenty-four hours after delivery.[9]

428. With these results before our eyes, I need not say that the *prognosis* is very serious. With the best assistance we can render, the results are very doubtful, but left to nature beyond a certain period, the majority of the cases end fatally.

Unless the previous history, or a careful examination, inform us of previous or present disease, our *diagnosis* will depend upon the fact that time and pains, with the usual remedies, have failed, and that the cervix is as rigid as ever.

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[1] Dr. Rawson, Lancet, July 23d, 1853, p. 96.

[2] Cases, vol. iii. p. 205.

[3] Merriman's Synopsis.

[4] Dublin Journal, vol. xvi.

[5] Ibid.

[6] Guy's Hosp. Reports, Oct. 1845.

[7] American Med. Journal, April, 1851, p. 342.

[8] Obstetric Med. and Surg., p. 242.

[9] Cases, vol. iii. p. 64.

429. *Treatment.* —When this is the case — *i. e.*, when we find that, notwithstanding sufficient time has been allowed, that the pains have been good, and the usual remedies have been tried in vain, and that the symptoms of powerless labor are setting in,—it is clear that we cannot be justified in leaving our patient to the efforts of nature so long as any resource remains.

In such cases it has been found that incision of the cervix, by liberating the head, affords both mother and child a much better chance than any other method. In Mr. Tweedie's case both mother and child were saved.[1] In Mr. Butler's case the cervix was incised in two labors: one child was saved.[2] In Dr. Buckminster's case both mother and child were saved.[3] In Dr. Gardner's case the mother was saved, but the infant was putrid.[4] In two cases by Dr. Pagan, both mothers were saved.[5] Many other such cases are on record, but these will suffice to show that, by this proceeding, the mother and frequently the child, may be saved, provided it be not deferred until the patient becomes exhausted; otherwise, as in Smellie's case,[6] the patient may die after delivery.

The two points, then, which require very great care and caution to determine are, 1. Whether the case is one which may be terminated naturally or by a milder method, and 2, if not, what is the proper time for operating. I have already stated that the setting in of the bad constitutional symptoms after the failure of the natural efforts aided by the usual remedies, will, in my opinion, indicate that more decisive help must be given if we hope to save the patient; and I should say that the moment we arrive at this conclusion is the proper time for putting it into execution.

The mode of doing so is not difficult; the points of a pair of probe-pointed scissors should be introduced between the head of the child and the cervix, and an incision made, about an inch long, on either side: if necessary, two more at right angles may be added; and I think there is less danger of a mischievous extension of the rent with four than with two. There is generally but little hemorrhage, and no pain. Great care should be paid to the state of the parts during convalescence.

Let me add that, contrary to what we might expect, it does not appear that an extension of the laceration to the body of the uterus is very liable to occur.[7]

430. I am aware, of course, that great names may be quoted against such a proceeding, but, with great respect, I would say that facts such as I have quoted are of higher authority than great names; and of late years some practitioners of ample experience have concurred in the propriety of the operation. M. Baudelocque advises it, after waiting a sufficient time, and trying ordinary means; Dr. Dewees is in favor of it in such cases; Professor Murphy prefers it to waiting for the child's death, and then craniotomy; Dr. F. H. Ramsbotham admits that in some cases it may be necessary; MM. Chailly and Cazeaux are in favor of it. Dr. Lever concludes that artificial dilatation is unjustifiable, but that incision is the proper remedy in insuperable rigidity for the purpose of preventing a laceration of the cervix such as he has recorded, and, *à fortiori*, for an alternative of rupture of the body of the uterus.[8]

431. 3. *Excess of liquor amnii.*—It occasionally happens that the secretion of liquor amnii is in excess, most probably in consequence of some inflammatory state of the amnion; at least the researches of M. Mercier and

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[1] Guy's Hosp. Reports, vol. iv. p. 119.

[2] London Med. Gaz., vol. xx. p. 589.

[3] Amer. Journal of Med., Oct. 1847.

[4] Ibid, July, 1852, p. 127.

[5] Edin. Monthly Journ., Aug. 1854, p. 172.

[6] Cases, vol. iii. p. 211.

[7] For more minute details, see the chapter on Occlusion of the Os Uteri, in Churchill's Diseases of Women.

[8] Dub. Hosp. Gaz., March 16, 1847.

others seem to favor this opinion. In other cases a considerable quantity of fluid is found between the amnion and chorion, thus adding to the bulk of the contents of the uterus. The state of over-distension involves no danger to the mother, though it certainly impairs the force of the uterus, and so prolongs the first stage. I may add that the child is often still-born or diseased.

432. *Treatment.*—We must be cautious in assuming this to be the cause of delay, and temporize until experience has proved that the uterine action is deficient. If necessary, rest may be procured by opium, and if, after that, there is no improvement, and the uterus be unusually large, the membranes may be ruptured; after which the pains become stronger and more frequent. Before we do this, however, we must be sure that the os uteri is dilatable, and the presentation natural.

433. 4. *Toughness of the membranes.* — Generally speaking, the membranes yield to the pressure from above about the time when the os uteri is fully dilated; but this is not always the case. They sometimes remain entire until protruded through the external orifice, but in these cases without causing delay; in other cases their adhesion to the uterus is more firm, and they neither break nor protrude, but of course occasion a prolonged first stage, because the liquor amnii which is retained prevents the more forcible contraction of the uterus. A very remarkable case has been recorded by the late Dr. Montgomery, in which extraordinary strength of the membranes resisted powerful uterine efforts for several hours.

434. *Treatment.*—The delay should never, on slight grounds, be attributed to this cause, and not unless the pains are active, and the os uteri perfectly dilatable: when no doubt remains, the remedy is obvious — viz., to rupture the membranes.

435. 5. *Absence of the "bag of the waters."*— Occasionally the head is placed in such close apposition to the lower segment of the uterus, that, being kept there by the pains, it covers the os uteri, prevents the formation of the bag of the waters, and deprives the patient of the wedge power in dilating the os uteri. In such cases the dilatation is effected by the head alone, as when the liquor amnii has escaped too early, and the effect is very similar. I have repeatedly seen the first stage of labor prolonged many hours from this cause in women who have had several children, and whose former labors had been very short.

[It is very certain that the dilatation of the os uteri in labor is liable to be very greatly impeded by the rupture of the membrane and the escape of the liquor amnii during or before the setting in of the first stage, not, however, from the bag of waters as a wedge forcibly dilating the os uteri. The true cause of the retardation of labor from the early rupture of the membranes, is because the pouch formed by the waters inclosed in the membranes, by adapting itself to the shape and inequalities of the cervix, makes more equable pressure on its fibres, and consequently subdues their resistance more equably than can any part of the child that may present without its intervention. The head being brought too early in contact with the cervix uteri by acting unequally upon its muscular fibres, while it overcomes the resistance of some, increases that of others, and thus delays the dilatation of the os uteri and increases the sufferings of the female by irritating it to an irregular and somewhat spastic action. Something similar, though not to the same extent, occurs when the head of the child, simply covered with the membranes, is brought early in labor in contact with the cervix uteri.]

436. *Treatment.*—Very little interference is necessary. In some cases we may be able to push up the head (very gently) during an interval between the pains, and so allow the liquor amnii to descend. If we cannot do so, we must allow time, and wait patiently, as the delay is seldom inordinate.

If, however, the patient should suffer from this cause, I should be inclined to rupture the membranes, provided it be not a first labor.

437. 6. *Premature escape of the liquor amnii.* — This may occur from weakness of the membrane, from violence, accidents, or careless examinations, and as the early dilatation of the os uteri is effected mechanically by the "bag of the waters" acting as a wedge, its absence will delay the operation by making the head of the child the dilating power, for which it is by no means so well suited.

438. *Treatment.* — If the pains be active, and the os uteri not rigid, all that is necessary is a little patience, and it is merely a question of time, involving, it is true, longer suffering to the mother, but no danger to her or her child. In all such cases, an early examination should be made, in order that no time may be lost, if the presentation be abnormal.

If the os uteri be undilatable, and with first children it is not unusual under the circumstances, the remedies already recommended (§ 423) for such a state of the parts must be employed.

439. *Obliquity of the uterus.*—The uterus may acquire an inclination one way or the other during pregnancy, from different causes, so as to affect the progress of the first stage, by destroying the unity of axis of the uterine cavity and pelvic brim, so that the head of the child is not applied in a right direction to the brim.

Thus the position in which the patient lies during pregnancy may give the uterus an inclination to the right or left, and the relaxation of the abdominal parietes may cause "pendulous belly." I have no doubt that obliquity may cause delay; but it is far less frequently the case than was supposed by Deventer, who first pointed it out to his disciples. Dr. Denman, who objects to Deventer's opinion, remarks, nevertheless, that "it must, however, be allowed that some labors are procrastinated by the mere oblique position of the os uteri." Dr. Wm. Hunter very truly remarks, "As far as I have been able to observe, the mere obliquity of the uterus never occasions so difficult a labor as to require any artificial arrangement to bring the os uteri into a proper situation. In such cases, as in many others, art can do little good, and patience will never fail."

The mal-position of the os uteri will be detected on making an examination; it will be found at one extreme of the transverse diameter of the brim, or close to the sacrum; and when our attention is thus excited, an examination of the uterine tumor will decide upon the existence of the obliquity. The mere deviation of the os uteri from its ordinary situation is not sufficient, because that will soon be altered by the pressure of the pains, if the axis of the uterine cavity be in accordance with that of the brim.

440. *Treatment.*—Although I do not believe that the completion of the first stage may be delayed by lateral inclination of the uterus, I cannot but agree with Dr. Hunter that little is necessary except patience; the uterine contractions tend, as we have seen, to bring the axes into accordance, and this may be aided by placing the patient on the side opposite to the inclination. I do not think that interference with the os uteri is necessary.

Few practitioners, I fancy, will doubt that, in an aggravated case of anterior obliquity, or "pendulous belly," the deviation from the proper direction must be a serious difficulty, and one that patience alone is not likely to remedy. In these cases it is customary, and very useful, to place the patient on her back, at least till towards the end of labor; but in some cases this alone is not sufficient. "We have found," says Dr. Dewees, "more than once, in cases of extreme anterior obliquity, that it is not sufficient for the restoration of the fundus, that the woman be placed simply on her back: but we are obliged also to lift up and support, by a properly adjusted towel or napkin, the pendulous belly, until the head shall occupy the inferior strait." I believe that this will be sufficient in all cases; but a very high authority—M. Baudelocque—practised further manipulation. In a case of the kind he attended, after placing the patient on her back, he says, "I raised the abdomen with one hand to diminish the obliquity of the uterus; while with two fingers of the other, after having pushed back the child's head very little, I was able to hook the anterior edge of the orifice of the uterus, to bring it towards the centre of the pelvis, where I kept it during a few pains; and then permitting the woman to bear down with the little strength she had left, she was delivered in the space of a quarter of an hour."

441. There is a certain condition of the os uteri, the result, probably, of some obliquity, although it is not externally perceptible, which causes considerable delay in the first stage. I allude to those cases where, in the progress of the dilatation of the os uteri, its anterior lip is caught between the head and the symphysis pubis, and its retraction prevented. It may also result from the unequal dilatation of the anterior and posterior half of the cervix, as in some cases I have found on examination during a pain, that although the posterior lip was dilated and retracted, the anterior was drawn still more tightly over the crown of the head. However produced, the effect is a delay of some hours in the first stage. Dr. Hamilton was the first, I believe, to call the attention of the profession to this peculiarity.

442. The remedy is simple: during an interval between the pains, the os uteri is soft and dilatable, and it is very easy with one finger to push the anterior lip over the crown of the head; and having done this with great gentleness, it should be maintained there by steady pressure during the next two or three pains. It will soon be felt retracting whilst contracting, and then it will slip over the head altogether. After this difficulty is removed, the labor will proceed more rapidly to its termination.

When the head fills the pelvis very tightly, it is not easy, nor in some cases possible, to raise the anterior lip, on account of the want of space; and as no force should be used, we are compelled in such cases to trust to the gradual predominance of the expulsive force over the resistance. And when the lip of the os uteri becomes œdematous from the pressure, or inflamed, as is not very uncommon, it will require great gentleness; in fact, if not easily raised, it had better be let alone.

443. The causes already enumerated may be considered natural ones, which, in general, can neither be foreseen nor prevented; but we are not to forget that delay in the first stage is frequently the result of mismanagement. Thus the use of cordials on the plea of supporting the strength, keeping the room hot and close, putting the patient to bed too soon, encouraging her to make efforts prematurely, injudicious attempts at assistance, omitting to evacuate the urine, etc., will all act upon the labor, and retard its progress. A well-instructed nurse will avoid these mistakes; but we may be called in after the effect has been produced, and then a little common sense will be our best guide.

444. These causes will act upon the first stage of labor, and although they offer a certain amount of obstruction, and make the labor other than a natural one, none are of such a kind as to prevent its being completed by the natural agents.

Again, we have seen that the delay in itself is attended with little, if any ill-effects to the mother, or to the child; that at most it occasions a degree of fatigue, weariness, and exhaustion (which is soon repaired); consequently, whilst this is a sufficient warrant for endeavoring to remove the cause, it does not justify our attempting to hasten the labor, merely because the first stage is tedious.

CHAPTER VI.

PARTURITION.—CLASS II. UNNATURAL LABOR.

ORDER 2. POWERLESS LABOR.

445. **Definition.** — The labor is prolonged in the second stage, by causes which act on the uterine power primarily or secondarily, rendering the pains feeble and inefficient, or totally suppressing them. In consequence of the stage at which the delay takes place, certain symptoms arise which render speedy delivery imperative. The pelvis is sufficiently roomy.

446. We have just seen that the delay in the first stage of labor is unattended with serious results to the mother, and very rarely to the child, and we remarked, that although feeble, the pains recur regularly; that the labor advances, though slowly; that the strength is not seriously impaired, though temporary fatigue may be induced; that there is no fever or local inflammation; that the vagina is cool and moist; the evacuation of urine and fæces easy; that there is no abdominal tenderness; and lastly, that even if unaided, the labor will be completed by the natural powers.

447. **Symptoms.** — We have now to investigate the effects of delay in the second stage; and we shall find them very different. For a time the second stage may continue without any bad symptoms, even though unusually long, nor can we fix a definite time after which they are developed; I have known them occur after six hours, or not until twenty or thirty hours have elapsed; but in general there are symptoms of constitutional suffering after the second stage has exceeded twelve or fourteen hours.

The pains which had been regular and powerful, are observed after this period to become irregular, both as to recurrence and force; for a while they may be more rapid, and then return less frequently, and evidently with far less effect. They may continue to grow weaker until the characteristic bearing-down effort ceases altogether; and with equal suffering we have the loud outcry and slight force of the first stage, just as though the labor had retrograded. In some cases the character only of the pains is changed, and not their frequency; in others they return at lengthened intervals.

448. Other symptoms accompany or shortly follow this break-down of the uterine action; the shivering which was mentioned as a symptom in natural labor, often becomes extremely severe, so as to resemble a slight convulsion; the vomiting becomes more frequent and distressing, and green or bilious matters are ejected; the patient is restless, throwing her arms about, and repeatedly changing her position; the skin is hot, whether moist or dry; the pulse rises and continues from one hundred to one hundred and forty; the tongue is dry, loaded, and furred, with sordes about the teeth; the mind is disturbed, fearful, and despondent; the vagina is hot, and, as well as the os uteri, tender to the touch; the bland mucous discharge is changed to a yellow or brownish color, and is sometimes, though rarely, acrid or fœtid; and the pressure of the child's head prohibits the evacuation of the bladder.

449. These symptoms succeed each other much in the order in which they are enumerated, if the patient be not relieved; of course they vary in degree, and in many cases some are absent; but sufficient will be present in every case when the second stage is excessively prolonged, to characterize the labor. Should the patient be so unfortunate as to obtain no assistance, the case goes on from bad to worse; all the symptoms are aggravated, and new and most formidable ones are added. The vomiting becomes more frequent,

and the matters ejected are dark-colored: the abdomen becomes tender, the jactitation and restlessness ungovernable, the pulse rapid and feeble, the skin covered with cold clammy sweat, the tongue brown and dry; the patient falls into a state of half-stupor, with low muttering delirium, and ultimately death closes the melancholy scene. In all such cases the child is in great jeopardy, and unless the woman be timely relieved, it will be lost.

That these symptoms do really arise when the second stage of labor is protracted, from whatever cause, will not be questioned by those whose experience among the mismanaged poor has been extensive; and there can be no doubt that they would arise in similar cases among the higher ranks, were not the assistance of art enabled to anticipate them.

450. CAUSES. — I do not profess to be able to explain why this series of alarming or fatal symptoms should result from delay in the second, rather than in the first stage of labor; it may be that the first stage is a more local, the second a more constitutional process; that in the latter the different systems of the body (vascular, nervous, muscular, etc.) are more deeply involved, and that a return to their natural state, without the removal of that which occasioned their implication, is impossible; or we may say, if we prefer, with the Arabian writers, that it arises, "*ex lege naturæ*," that the process must be fulfilled, or the lives of the mother and child be sacrificed. Whatever form of expression we use, the fact remains the same; the symptoms which arise from delayed second stage differ from those in the first, and the case will terminate fatally if unaided.

I have stated that these symptoms arise because of the delay in the second stage, and that they are the same, no matter what be the cause of the delay. It may be occasioned by some peculiar condition of the uterus itself, by obstruction in the soft parts, by deformity of the pelvis; but still we find the same series of symptoms. As the treatment differs according to the cause, I shall in this chapter refer only to those which affect the uterus itself, taking the phenomena which result as the general type.

451. *Inefficient or powerless condition of the uterus* in the second stage, as in the first, may be the result of various circumstances, such as weak constitution, mental emotion, disease, etc. Women of a *weak constitution*, especially in their first confinement, not unfrequently find the uterine powers fail, after some hours of endurance, and that without our being able to restore them. These are the cases, and these only, in which there is anything to fear from a prolonged first stage; for the exhaustion produced by it, and which in healthy women is of no consequence, may be the cause of inefficient uterine action in the second stage.

In women of an irritable nervous temperament, there is also occasionally a failure of uterine powers in the second stage.

Mental emotion, though it has less influence in the second stage than in the first, may nevertheless suspend the power of the uterus; and although in most cases it returns after an interval of freedom from pain, yet in others it does not, and bad symptoms set in.

Disease of the uterus, even when offering no physical impediment to delivery, may yet so interfere with the joint action of the muscular fibres, as to render the pains of little avail. Whilst this is confined to the first stage, it is of little import; but the uterus may complete that stage, and yet be seriously affected by the continuance of the same cause in the second; then the consequences become serious. Thus *rheumatism* of the uterus, which so often simulates the false pains and aggravates the suffering of the real ones, may at length interfere with the forcing pains, so much as to detract from their efficiency, or to render them almost nugatory.

Again, *tumors* in the uterus offer a mechanical impediment to the contraction of the organ, besides their interference with the conjoint action of

COO[illegible]
SAN F[illegible], CAL.

the fibres, and in some very rare cases they have been known to render the labor powerless. I saw a case rendered powerless by a tumor or tumefaction of the posterior part of the cervix. The crotchet was used, and after delivery I detected this condition of the neck.

Other uterine affections, acting upon a certain condition of the constitution, may render the organ unfit or unable to complete the process of delivery, and the delay being in the second stage, the symptoms already described will be developed, though the time at which they appear varies very much.

I need not say that mismanagement will greatly aggravate this tendency in all cases; and in some, good and judicious care may possibly avert it.

452. **Treatment.**—The cause of the bad symptoms of powerless labor is, as we have said, the delay in the second stage; but the reason of our interference is not the delay, but the urgency of the symptoms, so that if the labor should be prolonged, and no ill consequences arise, we should not be justified in interfering further than to remove the cause.

Of course a case of powerless labor, presenting the formidable array of symptoms I have described, will very rarely occur in the hands of a judicious practitioner, as he would previously decide upon the propriety of interfering; but we may be called to consult upon such cases. Our duty then will be to examine the condition of the patient carefully and minutely: the pulse, tongue, head, abdomen, and above all, the genital system, so as to appreciate correctly the present state of the patient; and not this only, but we must calculate, as accurately as possible, from the history of the symptoms, duration of the labor, etc., the rate at which the patient is running down. These investigations are for the purpose of solving three important questions.—1. Whether interference be necessary: 2. What mode of interference is preferable: and 3. The best time for interference.

453. 1. The *necessity for terminating the labor* is grounded chiefly upon the condition of the mother. If we find the pulse permanently quickened (say 100 or upwards), a degree of fever present, the head not advancing, from the pains having lost their force, with more or less of the other symptoms I have described, we may be pretty certain either that the natural efforts will not terminate the labor, or, supposing that possible, the condition of the patient will be so much deteriorated in the time required, as to render the delivery by the natural powers more dangerous than the employment of art. In forming a conclusion upon this point, the estimate of the "rate of progress" of the labor will be of great value.

454. 2. The *time at which we ought to interfere* will depend chiefly upon the rapidity of the accession and increase of the unfavorable symptoms, and partly also upon the condition of the child. For example, if the patient be getting rapidly worse, and the bad symptoms increasing formidably, the only object then will be to determine upon the quickest mode of delivery: but, on the other hand, if her state be less threatening, demanding less promptitude, then we may take into consideration the condition of the child, and acccording as we believe it to be alive or dead, we may venture upon a short delay, or deliver immediately.

I have already enumerated in detail the *signs of the life or death* of the child: the most important of which are, the results of repeated auscultation, the movements of the child felt by the mother, and the elastic feel of the integuments of the head. The positive evidence of the first two is quite conclusive; *i. e.*, when the fœtal heart is heard, or the movements felt, there can be no doubt that the child is alive, but their negative evidence is not so conclusive. We may conclude that the child has died during labor, if, after having heard the pulsations of the fœtal heart distinctly, we have found them gradually become weaker, and at length permanently inaudible; if the movements, at first lively and distinct, have ceased; and if the tumor of the scalp has acquired a flabby emphysematous feel. The peeling of the cuticle is valuable, but rather as a proof of the child having been dead some time. Now, what is the practical use to be made of a knowledge of the child's being living or dead? 1. If the child be dead, there need be no delay; the moment we are satisfied either that the natural powers will not be able to terminate the labor, or that the condition of the mother demands assistance, we may instantly interfere, and we are free to consider the mother's interests only as to the mode of doing so. 2. If the child be living, and the symptoms not very urgent, a short delay may be allowed, so as to give fair play to the natural powers; or if immediate relief be desirable, we should give the child a chance, if possible, by employing means which do not necessarily involve its destruction. But I would repeat, that the saving of the mother's life being our first object and attainable, if the circumstances of the case demand it, we must discard all consideration of the child, even if it be alive, unless compatible with the mother's safety.

455. 3. The *modes of delivery* at our command are, 1, the vectis; 2, the forceps; 3, the crotchet. We may lay it down as an axiom that that method of delivery is best by which labor can be terminated most easily, and with the greatest safety to the mother and child. If there be space enough between the fœtal head and the pelvis, the vectis may be tried as a tractor; but the forceps is a much better instrument, for if it can be applied without force (and in no other case should it ever be attempted), we hold the power of delivery in our own hands, and unless the pelvis be found too small, or the operator deficient in dexterity, but little time will be lost, and no injury be done to mother or child. Even taking the statistics amongst the poor and worst-managed part of the community, the mortality to the mother is one in twenty-one, and to the child one in five, which is less than that attendant upon other operations.

I have therefore no scruple whatever in recommending a trial with the forceps before using the crotchet, in every case where there is sufficient space, except in those cases where the child is dead.

If the state of the mother preclude all consideration for the child, or if it be dead, then the perforator and crotchet may be used, the great advantage of this operation being the facility of delivery when the bulk of the head is reduced, and its disadvantage, the damage done to the child. I shall speak more in detail about these operations by and by.

456. If the case be from the beginning under our own care, and our interference be well-timed and ably executed, in all probability the patient will recover well; but if she have been neglected and allowed to run down before assistance is rendered, unpleasant consequences may follow, as, for instance, the *nervous shock* may be severe, or even fatal; the patient sinking, twelve or twenty-four hours after delivery, without ever rallying after the operation. Again, from the long-continued pressure of the head of the child upon the soft tissues of the pelvis, inflammation may arise, and unless subdued, may terminate in pelvic abscess, or abscess between the vagina and rectum; in sloughing of the vagina, with or without perforation of the bladder or rectum; or the contusion of the parts may be so severe as to cause the patient to sink; or lastly, peritonitis or hysteritis may be developed somewhat later.

Such serious consequences, which are unfortunately but too frequent, indicate the necessity not merely of terminating the labor by judicious and timely aid, but also of attending minutely to the local condition of the patient for some time after delivery. Especial directions should be given to the nurse to syringe the vagina two or three times a day with tepid milk and water, to bathe the external parts with a weak mixture of spirit and water, and to place between the labia a strip of lint smeared with simple cerate, and if necessary we should satisfy ourselves by a careful examination as to the state of the parts. If much inflammation arise, a large soft poultice of linseed meal, or "stirabout," may be applied over the external parts, and black wash to the vulva.

I must beg of the reader to reperuse the chapter on Abnormal Convalescence, in connection with this and some of the subsequent chapters, as the deviations therein described occur most frequently after the more dangerous labors.

457. Before concluding this chapter, I would wish to allude more distinctly than I have as yet been able to do, to an interesting, though not numerous class of cases, exhibiting the symptoms, more or less intense, of powerless labor, with the exception of the inefficiency of the pains. The pulse is rapid, the patient very feverish, the head may be affected, or the abdomen tender, etc.; yet the labor, though sufficiently tedious to give rise to these symptoms, does actually advance, and may be completed by the natural efforts, but at a serious expense to the mother, and great risk to the child. I was called to such a case some time ago: the patient had been allowed to deliver herself, and she died of the shock in a few hours. The local injury already described is also more frequent after these cases than even after those where assistance has been given. I know not any cases in which the physician has more need of all the tact and judgment which experience only can give, nor any more difficult to describe in a book so clearly as to guide the junior practitioner, than such as these. The natural powers are not inadequate to the delivery, yet bad symptoms are present, the danger imminent, and greatly increased by delay. On the one hand, we have to guard against unnecessary interference, and on the other, against the evils of hesitation when assistance is required. As it is clear that the possibility of the labor being finished by the natural powers alone is not in itself a prohibition of all interference, I can only repeat that the necessity for our aid, and the time when it ought to be given, must be deduced from a careful estimate of the present symptoms, and the rate at which they have been developed; and if we find that the probable time required for the completion of the labor will be so great as to add to the patient's risk, then ought we undoubtedly to put in requisition all our resources for her liberation.

CHAPTER VII.

PARTURITION.—CLASS II. UNNATURAL LABOR.
ORDER 3. OBSTRUCTED LABOR.

458. Definition. — The progress of the labor is impeded by some mechanical obstruction in the passages connected with the soft parts, which, by causing delay in the second stage, leads to the development of the symptoms of powerless labor.

459. Symptoms. — In the last chapter I stated that delay in the second stage of labor gives rise to a certain series of formidable symptoms, no matter what may be the cause of delay; and we there considered such causes as act upon the uterus, impeding its action or diminishing its force. In the

present chapter we shall investigate other causes of delay, such as are found in the soft parts of the passages.

The symptoms in the two orders will be the same, if the amount of delay be equal; but there is this difference from the commencement, that in obstructed labors the uterine action is intact, nay, perhaps more vigorous than usual, but ineffective in proportion to the magnitude of the obstacles. If they be not very great, the augmented force brought to bear upon them may be successful; if they be considerable, delivery may be impossible without assistance; and lastly, in some extreme cases, delivery "*per vias naturales*" may be impossible.

Making allowance for different constitutions, the symptoms developed during the progress of labor will be in proportion to the prolongation of the second stage, as laid down in the last chapter. It will be remarked, however, that some of the causes I am about to enumerate act upon the first stage. They certainly do prevent its completion, and by rendering the progress of the labor mechanically impossible, do really give rise to the unfavorable symptoms, and so far may be taken as an exception to the conclusion, that no evil arises from a prolongation of the first stage. However, I believe that in such cases the first stage virtually terminates before the bad symptoms set in, for I have repeatedly found that where the physical impediment exists at the brim, whether it be a tumor or distortion, the os uteri is fully dilatable, the membranes broken, the character and force of the pains changed as usual, etc.; in short, a transition is observed from the local and general condition of the first stage to that of the second.

460. CAUSES. 1. *Minute or imperforate os uteri.*—There are cases on record in which before labor, or even for some time after its commencement, no os uteri could be detected. Mazzoni mentions having observed such, and Dr. Campbell relates two examples: "Both were first pregnancies; in the first, uterine action continued about twelve hours before the os uteri could be distinguished, when it felt like a minute cicatrix. The second woman had regular pains for two nights and a day before the os tincæ could be perceived, and she suffered so severely as to require three persons to keep her in bed. Both patients were largely bled, gave birth to living children, and had a good recovery." I was myself called to a case in which the os uteri was not discoverable until after forty hours of labor, and then it felt about the size of a small crow-quill; notwithstanding the delay and obstruction, however, the patient was delivered naturally of a living child.

As the effect of disease, the os uteri may be contracted, and its opposite edges become adherent, so as to close it partially or completely. Again, the os uteri may be diminished and the cervix rendered undilatable, by cicatrices, the result of former injuries.

Lastly, cases are on record of total absence of the os uteri, without our being able to trace out the cause; some probably are congenital. Under one or other of these classes, observations will be found recorded by Smellie,[1] Wright,[2] Cuffe,[3] Tompkins,[4] Hatin,[5] Tweedie,[6] Waller,[7] Naegelè,[8] Gooch,[9] Lauverjat,[10] Gautier,[11] Morlanne,[12] Bedford,[13] etc.

The amount of delay will depend upon the resistance, and this chiefly upon the completeness of the closure of the os uteri. When there is a small opening, there is hope that time, pains, and the remedies mentioned for rigidity of the os uteri, may succeed. If these fail, then the remarks I made on that subject apply to these cases. The natural result of such cases, and, *à fortiori*, of those of complete closures of the os uteri, are, 1, exhaustion and collapse; 2, separation of a part or the whole of the cervix; 3, rupture of the uterus.

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[1] Works, vol. iii. p. 55.

[2] London Med. Gazette, 1846, p. 688.

[3] Ryan's Journal, vol. vi. p. 87.

[4] Lancet, 1831-2, vol. i. p. 749.

[5] L'Expérience, May. 1839.

[6] Guy's Hospital Reports, vol. ii. p. 258.

[7] Ibid., vol. iv. p. 120.

[8] Ibid., vol. iv., p. 137, from Naegelè's Thesis.

[9] Lectures on Midwifery, by Skinner.

[10] Dict. des Sciences Méd., vol. xxiii. p. 301.

[11] Ibid.

[12] Ibid.

[13] New York Journal of Med., March, 1843, and American Journal of Med. Science, April, 1848.

If the reader will consult my work on Diseases of Women, he will find the cases given, and fuller details upon the subject.

In cases of so serious a character, a correct diagnosis is of the last importance, and should be made with the utmost care and caution. "We may suspect," says Dr. Rigby, "that the protraction of labor arises from agglutinated os uteri, when at an early period of it we can discover no vestige of the opening in the globular mass formed by the inferior segment of the uterus, which is forced down deeply into the pelvis, or at any rate when we can only detect a small fold or fossa, or merely a concavity, at the bottom of which is a slight indentation, and which is usually a considerable distance from the median line of the pelvis. The pains come on regularly and powerfully, the lower segment of the uterus is pushed deeper into the cavity of the pelvis, even to its outlet, and becomes so tense as to threaten rupture; at the same time it becomes so thin, that a practitioner who sees such a case for the first time would be induced to suppose the head was presenting, merely covered by the membranes. After a time, by the increasing severity of the pains, the os uteri at length opens, or it becomes necessary that this should be effected by art; when once this is attained, the os uteri goes on to dilate, and the labor proceeds naturally, unless the patient is too much exhausted by the severity of the labor."

461. *Treatment.* — Our first object will be to see what the natural powers will be able to effect; for which purpose the patient must be managed as in natural labor, and allowed to continue her efforts for some time; there is no danger in so doing, as it will be a considerable time before any unpleasant symptoms will arise.

If the continued pressure discover the os uteri, but the cervix resist still, then we may try any of the remedies advised for "undilatable os uteri," such as venesection, tartar emetic, etc., and in most cases they will be found useful.

In some cases, when the os uteri is more or less closed by agglutination, although, as Dr. Rigby observes, "the obstacle is capable of resisting the most powerful efforts of the uterus, a moderate degree of pressure against it, whilst in a state of strong distension, either by the tip of the finger or a female catheter, is quite sufficient to overcome it; little or no pain is produced, and the appearance of a slight discharge of blood will show that the stricture has given way."

If these methods fail, we must have recourse to the knife, and make one or more incisions as near the situation of the os uteri as possible. Moscati recommends a number of small incisions around the os uteri, for the purpose of securing its equable dilatation.

[The young practitioner should not be too hasty in deciding that a case is one of agglutination or absence of the os uteri, in which the latter cannot be reached by the finger for some hours after labor has set in—and that an operation is necessary to obviate the consequent impediment to the birth of the child. In first labors, the os uteri is not unfrequently found high up, in front of the promontory of the sacrum, and almost out of reach of the finger. It may remain thus for many hours undiscovered by the inexperienced, and although it may cause much delay in the labor, it will in time be brought into the axis of the strait by the force of the pains. This may be expedited, after labor has continued some time, by drawing it forward with the fingers, as advised by Baudelocque.]

It is gratifying to know that this formidable operation is not attended with so much danger as we might expect. In five cases, both mothers and children were saved; in four, the mothers were saved, but not the children; and in two only did death occur after the operation, and in both great delay had been permitted.

462. 2. *Carcinoma or scirrhus of the uterus.*—Strange as it may appear, conception has been known to take place not only when the cervix uteri was carcinomatous, but when it was the seat of open cancer. Zeppenfeld, Siebold, Lachapelle, Oldham, and others, have put such cases upon record. Madame Lachapelle records seven cases, of whom four recovered from the delivery. Of course such a hardened and undilatable state of the cervix will offer a very serious obstacle to the descent of the child's head, and that in proportion to the extent of the disease. In a few instances it has yielded to the pressure, and the child has been born naturally.

I attended myself a case in which corroding ulcer proved a cause of delay for some hours, but just as we were debating the propriety of incising the cervix, spontaneous rupture took place under the pressure of a powerful pain, and the child (still-born) was expelled. The mother died afterwards from the consequences of the rupture, which had extended into the body of the uterus. And more recently, I was consulted in another case of malignant ulceration, where conception afterwards took place; the patient went nearly to the full time, and had a natural labor, but sank a few hours afterwards.

463. *Treatment.*—Fortunately such cases are extremely rare; but from those who have been most conversant with them, we find, according to Bayle, Cayol, and Lachapelle, that some have terminated without help; others, according to Siebold, have been delivered by version: or, according to Madame Lachapelle, by the forceps and by vaginal hysterotomy. If the cervix resist all the efforts of the uterus, I suppose we must, as a "*dernier ressort,*" have recourse to the knife; but it is for the sake of the child only, as the mother's end will only be hastened by it, and therefore, before doing it, we must be sure that the child is alive. If it be not, it would be better to open the head.

464. 3. *Narrow and undilatable vagina.*—In some women the vagina is naturally small and contracted; but this is rarely a serious obstacle to the natural powers, unless it be the first child, and the patient advanced in life.

The calibre of the vagina may also be diminished by callosities or cicatrices, the consequences of former inflammation and sloughing, and which, consisting of a semi-cartilaginous substance, may form rings or spirals around the vagina, and offer great resistance to the descent of the child. These obstructions will be detected at once, on examination, by their hard gristly feel, and their form.

Lastly, more or less perfect occlusion of the vagina may be present, owing to the adhesion of its sides, sometimes leaving a portion of the vagina pervious inferiorly, sometimes obliterating nearly its whole length.[1]

The impediment which a congenital narrowness of the vagina offers is overcome by patience and pains, aided by fomentations or injections before unfavorable symptoms arise; but when it is obstructed by adhesions or contractions, this may not take place. The labor is prolonged beyond a certain time, and then the symptoms of powerless labor (§ 447) set in, and on examination, the cause of the delay is sufficiently clear.

But this is not all. My friend, Dr. Doherty, has very justly observed, in a paper read before the Obstetrical Society, "It is very seldom, even when a single and prominent band encircles the canal, that this is the only mischief which has been done; for, generally speaking, we have more or less puckering of the parietes, and not infrequently, as I have already mentioned, communications with the adjoining viscera. The consequence of these changes is, that the canal is less able to bear a forcible dilatation; and if the narrowed portion be permitted to delay the fœtal head too long, a rupture of the vagina above it may occur, even if no breach of surface already exist. But if even a small opening into an adjacent cavity be already formed, it is very likely to be converted into a rent, which throws both chambers into one, constituting one of the greatest calamities which can befall a woman.

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[1] Churchill on Diseases of Women.

Still worse, if possible, is the result occasionally; for abundant testimony is on record, as I have elsewhere shown, to prove that this obstruction of the vagina, when left to the natural efforts beyond a certain time, may give rise to rupture of the uterus, and death.

465. *Treatment.* — As in the cases last described, we must wait until experience has proved how far the natural powers are capable of overcoming the resistance. 'In some cases we find, contrary to our expectations, that after the pressure of the child's head has continued for some time, the stricture yields, and, as it were, unfolds, so as to permit the passage of the child. In other cases, laceration takes place (not without danger), and delivery follows.

Should the parts continue to resist steadily, then we must have recourse to bleeding and tartar emetic, which will very often preclude the necessity of relief by the knife. If they fail in producing benefit within a reasonable time, we must interfere to prevent worse results — either the constitutional symptoms already noticed or local injury.

To avert such a catastrophe, we must have recourse to the knife, if the previous remedies fail; two, three, or more incisions should be made, just through the resisting band, if it be circular; but if the sides of the vagina be adherent, they must be carefully and gradually divided. The pressure of the descending head will dilate the passage. The greatest care must be taken not to wound the neighboring viscera. The hemorrhage may be considerable, and occasionally the case terminates fatally.

Should the uterine action be exhausted by the length of the labor, and unfavorable symptoms develop themselves, it may be necessary to terminate the labor promptly by instruments. I am myself satisfied that, in the more aggravated cases of stricture, premature labor or abortion ought to be induced, if we are cognizant of the fact at an early period.

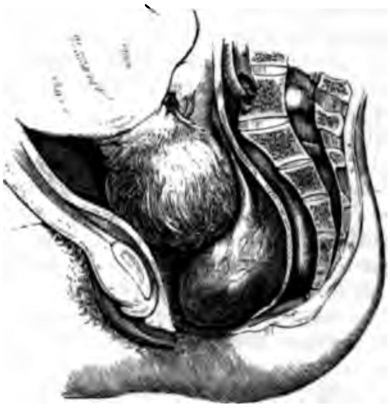
I need not say that in the after treatment the most careful attention should be paid by the accoucheur himself to the state of the vagina, and as soon as the inflammation and tenderness subside, a bougie should be introduced daily, to guard against the re-formation of the stricture.

466. 4. *Tumors in the pelvis.*—Tumors of various pathological characters may form in the different parts of the pelvis: thus we may have fibrous, adipose, steatomatous, sarcomatous, and scirrhous growths, and they may be situated either behind the rectum, between the rectum and vagina, or in connection with the proper tissues of the vagina. Again, the os uteri may give origin to a tumor, as polypus. Dr. Denman met with a case of cauliflower excrescence of the os uteri.

This is not the place for the description of these various diseases, which I have fully discussed in another volume. Our object at present is to inquire what is their effect upon labor. The obstructions they offer to the descent of the child's head will depend upon their size, their mobility, and their compressibility. If small, the delay may be immaterial, and the difficulty overcome by extra force; but if beyond a certain size, they may delay the labor so long as to give rise to the unfavorable symptoms of a prolonged second stage, or absolutely prohibit the passage of the child. But this effect of their size is sometimes obviated by their mobility, *i. e.*, the tumor may be pushed to one side, or drawn up out of the way of the child, as in a case published by my friend, Dr. Beatty, in which the tumor was so large, and apparently so fixed, that Cæsarian section was anticipated; nevertheless, at the time of labor it was elevated sufficiently to allow of the birth of the child without any assistance. In the case of a polypus too, we find that in some cases the pressure of the child's head has detached the tumor, or expelled it without separation, as related by Dr. F. Ramsbotham. Lastly, in cases where the tumor is too large, and immovable, it has been found so far compressible, that after some delay and extra compression of the child's head, the labor has terminated naturally.

The chances in favor of the tumor being elevated or pushed out of the way, are increased in proportion as it is high up in the pelvis; next to these the most favorable situation is on one side of the promontory of the sacrum, and the least so, in the antero-posterior diameter. The difficulty occasioned by the size is augmented by the hindrance they offer to the adaptations of the head, and to its successive changes of position.

Fig. 107.



Polypus Uteri.

467. When we have reason to believe in the presence of any of these tumors, a most particular investigation should be instituted. The examination, as Mr. Ingleby observes, "should be made in the absence of pain, and (if possible) before the presentation has become engaged in the pelvis, lest the tension which the mass undergoes during strong labor should obscure the diagnosis. If the presentation be in part only below the brim, it may be difficult to determine whether the apparent firmness of the tumor is not owing to obstructed circulation. Whilst making the usual examination '*per vaginam*,' it will be advantageous to pass the forefinger of the left hand into the rectum, with a view of ascertaining more correctly the contents of the tumor."[1]

468. *Treatment.*—If, owing to the moderate size of the tumor, its mobility or compressibility, there is a probability of the natural powers being adequate to the delivery, we have nothing to do but wait patiently; but if the delay be so excessive as to threaten bad symptoms, or if the obstruction be

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[1] Facts and Cases in Obstretric Medicine, p. 121. I beg to refer the reader to this excellent essay, and to Dr. Merriman's paper in the Med.-Chir. Trans., vol. x., for much valuable detail which I have been obliged to omit.

insurmountable, we must then afford assistance, and the mode will depend upon the size, mobility, contents, or mode of attachment of these tumors.

Thus, if the tumor be movable, and we see the patient sufficiently early, we should endeavor to raise the tumor above the brim of the pelvis, as was done by Dr. Merriman, during an interval between the pains, and maintain it there during the next pains, so as to allow the head to become engaged in the brim; and to do this the patient should be placed on her knees and elbows, so as to have the influence of gravitation in our favor; if we succeed, the labor will go on regularly; but if, as is most frequent, we fail, we must then try if the tumor be removable. If it be a cauliflower excrescence or a polypus, it will be advisable to pass a ligature around it. In the case of polypus this has repeatedly been done with impunity. Other tumors have been removed, as in Mr. Drew's case of one between the vagina and rectum, with success; but this is a much more serious operation, and should not be attempted until we are certain that its bulk cannot be reduced in another way.

Many of these tumors are composed of fluid or semi-fluid matter, and such may be emptied by passing a trocar and canula, or by a free opening with the scalpel; after which the walls of the cyst will subside, and allow of the passage of the child. This operation should always be performed before we attempt delivery by operating upon the child.

If a slight operation upon the tumor is likely to be successful, there cannot be the least doubt that it ought to be preferred, nor do I myself feel that we should be justified in sacrificing the child where there existed any hope of being able to extirpate the tumor.

469. But suppose the tumor be solid, immovable, and incompressible; then it is clear that our only means of delivery is to act upon the child, and the mode will depend upon the size of the tumor. If it be small, though sufficient to obstruct a labor attended with feeble pains, then perhaps the addition of extracting force by means of the forceps may suffice. These cases, however, are very rare, and we must take care that the force employed do not add to the subsequent risks, by inducing the evil results of excessive pressure upon the soft parts of the mother.

If the tumor be too large to allow of the use of the forceps, or if they have been tried unsuccessfully (extirpation being out of the question), we have then no alternative but the reduction of the bulk of the child by craniotomy, and, if necessary, evisceration. This, however, is so painful an alternative, that it should never be thought of until we are satisfied that nature is inadequate to the delivery, that the obstacle cannot be pushed aside, nor lessened by puncture, nor removed, etc., and that interference has become imperative in order to save the life of the mother.

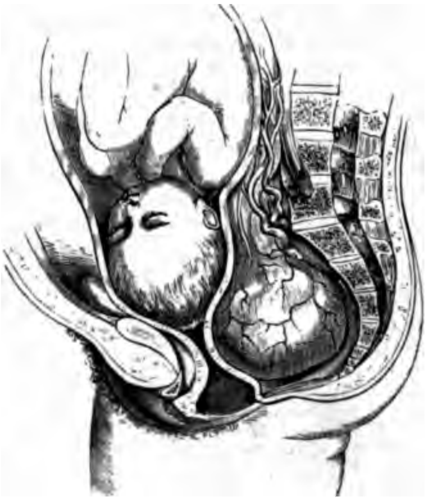
Some few cases occur in which even craniotomy will not enable us to effect the delivery; in which the pelvis is very nearly filled by a firm incompressible tumor, as in the cases related by Dr. Montgomery, Dr. Shekleton, and others. We have no remedy for such, except by providing an artificial exit for the child, by performing the Cæsarian section; a formidable and very fatal operation, it is true, but which is infinitely better than leaving mother and child to perish. But before having recourse to it, we must be perfectly satisfied that no other means afford a hope of success; and I need hardly add, that none of these serious operations should be undertaken without a consultation, if that be possible.

470. 5. *Diseased ovary.*—The ovary may be enlarged from disease originating previous to or during pregnancy, and not suspended by it. The enlargement is sometimes solid, but more frequently it contains fluid, or matter the consistence of honey. If the disease progress slowly, the uterus with the ovaries by its side, will have emerged from the pelvic cavity in time

to remove the obstacle, which will then be in the abdominal cavity. But in other cases, either from the situation or rapid increase of the ovarian tumor, or by adhesions between it and the neighboring parts, it is retained in the pelvis, and may offer serious obstruction to the second stage of labor. "There are two forms of ovarian tumor," says Mr. Ingleby, "which obstruct the passage of the child. In the one a small cyst in connection with a very bulky cyst, or else a portion of a large cyst, passes into the recto-vaginal septum, and bulges through the posterior part of the vagina. In the other, and that which occurs by far the most frequently, the whole ovary, moderately enlarged, prolapses within the septum. The descent is peculiarly liable to happen at two periods: the first, near the end of gestation; the second, during labor; the prolapsus being promoted by the relaxation of the soft parts. The changes which the ovary undergoes when long detained in the septum, will depend upon the capacity and yielding state of the parts. If the woman have not previously borne children, it may remain small, and scarcely retard delivery: but under contrary circumstances, it acquires a large size, and nearly fills the vagina. In rare cases, the bulging is said to have appeared at the anterior part of the pelvis. Again, the ovarium, when moderately enlarged, and confined within the abdomen, may alter the course of the gravid uterus in its ascent out of the pelvis, so that the organ can neither preserve its perpendicular direction, nor freely develop itself on the side on which the tumor is situated, and thus the lateral obliquity, as described by writers, is almost necessarily produced. Although this mal-position of the uterus may fail directly to obstruct the entrance of the presentation with the brim, the axis of the organ as respects the pelvis is no longer maintained, and labor will probably prove tedious."

A very remarkable case has been published by Mr. Rankin and Dr. Wilson, in which an ovarian tumor occupied the pelvis in two labors, during the latter of which it was pushed above the brim, and the child delivered by turning. In the third labor, there were two tumors above the pelvis, and the child passed between, rupturing one, and was delivered naturally.[1]

Fig. 108.



Ovarian Tumor.

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[1] Glasgow Med. Journal, Jan. 1854, p. 414.

The observations made upon other tumors in the pelvis are in most respects applicable to enlarged ovaries. There will be delay in the second stage, or the head will be prevented altogether from entering upon this stage, in proportion to the size, immobility, and incompressibility of the tumor; modified in some degree by its situation. But an ovarian tumor is much more likely to be moved out of the way of the child at the time of labor, than any other, and also more apt to give way and burst under the pressure of the head.

The diagnosis is not always easy. If the tumor within the recto-vaginal septum be movable, elastic, and communicating to the finger a sense of fluctuation, it is probably ovarian: but it is not always thus; it may be hard, not fluctuating, and, in fact, to the touch apparently solid. In such cases the only test we can apply, practically, is puncture. Dr. Litzmann, who has published a valuable paper on this subject, states as the ground of diagnosis between ovarian tumors and fibroid cystic growths, their gradual direction from one sacro-iliac synchondrosis towards the centre, and the possibility of pushing them more or less easily above the brim of the pelvis. Fibrous or scirrhous growths are to be distinguished by their place of origin.

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[illegible]

in an ill state of health for eighteen months, and then sank under her sufferings; the third recovered.

Thus, in 18 cases, it appears that of the women,

9 died,
3 recovered imperfectly,
6 perfectly,
Of the children, 15 were still-born,
3 were alive.

"Upon the whole," Dr. Merriman concludes, "the evidence we at present possess is more in favor of opening the tumors, when they contain a fluid, than of any other mode of procedure; for of the nine women who recovered more or less perfectly, five appear to owe their safety to this operation, and of the children born alive, two were preserved by the same means."

In these cases, the mortality to the mothers was very great; and though in all cases there must be risk at the time and subsequently, still there is reason to hope that a cautious estimate of the value of the different means at our command, and an early and judicious employment of them, will insure a more favorable result. In such cases it must be borne in mind, that whilst the obstacle occasions the necessity for the operation, the time must be decided by the constitutional symptoms, or, at least, that assistance must never be delayed after the symptoms of powerless labor set in.

Dr. Litzmann has collected from various sources forty-seven cases, involving fifty-six labors, in which the process was impeded by ovarian tumors. Of the entire, seven children were born alive, thirty-five were still-born, of fifteen there is no account; of the mothers, thirty-two recovered and twenty-four died. The details are as follows:—In ten cases natural delivery took place, mostly after tedious and severe labor. One child was born alive, of the others nothing is said; four of the mothers died. In seven cases the tumor was pushed above the brim; in three of these turning was performed; in one the forceps were applied; the rest terminated naturally. Two of the children were still-born; and of the remaining five, two speedily died. One of the mothers died. In nine cases, puncture or incision of the tumor was performed: once through the abdominal parietes, twice through the rectum, in the rest through the vagina. In three cases the labor terminated naturally; in three, perforation and extraction was necessary; in one turning, and in one the forceps. One child was born alive, and five of the mothers died. The forceps were applied altogether in eleven cases, in seven of which they were the only means employed. Of these, two children were still-born, and four mothers died. Turning was performed in eight cases. Embryotomy was performed in seventeen cases; in four after puncture, and in one in artificial premature labor. Of the remaining twelve cases, five were fatal to the mothers. Premature labor was induced in two cases.[1]

472. With respect to all tumors of the pelvis which have rendered the use of the perforator necessary, I would wish strongly to recommend the induction of premature labor in the next pregnancy, at such a period as shall supersede the necessity of an operation, provided that the size, situation, and density of the tumor continue the same.

473. 6. *Vaginal cystocele.*—I have already spoken of the necessity of keeping the bladder empty, as its distension very often protracts the labor; but the effects may be more serious, if from frequent child-bearing the posterior and inferior supports of the bladder have been weakened, for then it

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[1] Association Journal, May 27th, 1853, p. 469, from Deutsche Klinik, 1852.

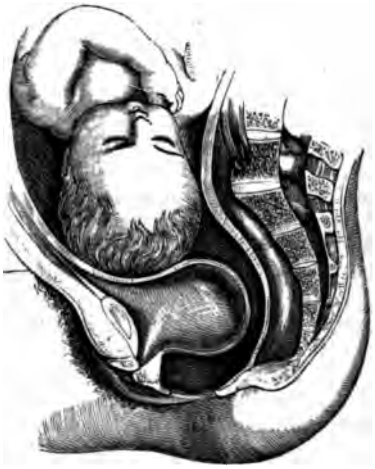
may be caught by the head of the child in its descent, and pushed before it into the cavity. Fortunately such cases are very rare, for their consequences may be very serious. Two very interesting cases, however, will be found recorded by the late Mr. Crosse of Norwich,[1] and one by Dr. Doyle.[2]

The patient will complain of fulness, tension, a feeling of pressing down and dragging, with a desire to evacuate urine frequently, and of inability to do so. On examination we detect a tumor in front of the pelvis, partially covering the head, and containing fluid. The finger passes easily posterior to the tumor, but not anteriorly, and the catheter cannot be passed in the usual direction, indicating clearly its nature. With care, there is not much danger of an incorrect diagnosis, but if not on our guard we may mistake it. Dr. Merriman relates a case where the bladder was perforated on the supposition that it was a hydrocephalic head, and Dr. Hamilton used to mention one in his lectures, where it was mistaken for the bag of waters, and punctured.

No doubt, a bladder sufficiently distended and prolapsed must occasion difficulty and delay in the second stage, but the danger to the mother from the rupture of that organ is at least equal to the risk of mischief from the delay.

474. *Treatment.*—This double danger renders it necessary that when we are assured of the nature of the impediment, we should be prompt in our endeavors to remedy it. A male elastic catheter must be introduced, with the point directed downwards and backwards, and if the head have not descended too low, we shall probably be successful in emptying the bladder.

Fig. 109.



Vaginal Cystocele.

The head may also be raised a little with the finger during an interval, to facilitate the introduction. Even if we succeed, it will be necessary to watch carefully against the effects of the previous pressure; but if we fail, and either the labor be arrested by the obstacle, or the pressure threaten a rupture, our only resource, I believe, is to tap the bladder with a very fine trocar, through the vagina. Let me, however, impress upon my junior readers the necessity of being quite certain of the nature of the case, and of the prolapsed bladder being really an impediment, or in danger of rupture, before attempting so serious an operation.

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[1] Cases in Midwifery, p. 62.

[2] Dublin Med. Press, No. 95, Lect. 28, 1840.

Should the quantity of urine be moderate, and the pressure not excessive, and especially if the head of the child be small, the case may perhaps be left to nature; but then, after the labor is over, we must immediately evacuate the bladder, and watch the patient carefully.

475. 7. *Calculus in the bladder.* — It is very rare that urinary calculus has been found an obstacle to labor; but such cases are on record. Guillemeau was the first to relate one: the result was contusion, sloughing, and vesico-vaginal fistula. La Gonache performed the operation of lithotomy under similar circumstances, and extracted a calculus several inches in circumference. Smellie relates a case which occurred in the practice of Mr. Archdeacon, in which the calculus was expelled by the pressure of the head, after a long and tedious labor: the patient suffered from incontinence of urine afterwards. M. Dubois detected a calculus in the bladder pressed down by the head of the child; and M. Phillippe, of Rheims, extracted one in the fifth month of pregnancy. M. Monod has published a case of this kind, in which he removed a calculus, weighing nearly three ounces, by vaginal lithotomy. It had proved an insurmountable obstacle to the progress of labor, filling the entrance of the vagina. The labor was completed by the forceps, but the child was still-born. The patient recovered well, the urine passing by the urethra the following day.[1] Mr. Erichson also relates a similar case which rendered perforation necessary, and afterwards the removal of the stone by vesico-vaginal section.[2]

So long as the bladder and calculus remain above the brim of the pelvis, no mischief will result; but if it project backwards, and be caught by the head, and pushed down before it, the bladder will be seriously bruised, and the labor impeded in proportion to the size of the calculus.

A careful examination will show that the tumor is covered by the bladder, and its hardness will indicate its nature.

476. *Treatment.*—If the calculus be discovered during the first stage of labor, it may be impossible to raise it above the brim, and to maintain it there until the head is engaged, after which there will be no danger; but if we cannot do this, I fear our only resource is vaginal lithotomy; as it is much better to have to deal afterwards with an incised wound than a laceration.

477. 8. *Vaginal hernia.* — It is very possible for a loop of intestine to slip down behind the uterus into the "*cul de sac*" between the vagina and rectum, and if it be empty, it will be no impediment; but if it contain a mass of scybalæ, that will form an obstacle to the descent of the head, but one that is seldom attended with danger, except from the pressure to which the intestine is exposed.

478. *Treatment.*—If the hernia can be reduced, it must be done as early as possible; but if not, we may be able to deliver with the forceps. I never heard of its being necessary on this account to lessen the child's head.

479. 9. *Collection of fœces in the rectum.* — This is not a very uncommon cause of delay towards the end of labor, nor is such an accumulation inconsistent with frequent and fluid, but small, evacuations daily. It is easily detected; the tumor is felt in the situation of the rectum, and its irregular form and want of elasticity would almost be sufficient to indicate its nature. It is possible, however, to press it downwards, and then the escape of fæces will put the question beyond doubt.

480. *Treatment.*—If proper care have been taken during pregnancy, and the first stage of labor, we shall never be troubled by this obstacle; but if

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[1] Med. Gazette, March 20th, 1850, from L'Union Médicale. Also Crosse's Cases in Midwifery, p. 64.

[2] The Lancet, Dec. 8th, 1855.

not, we must remedy the neglect by enemata of warm water whenever we detect the state of the intestine; and if, as in some rare cases, this be not sufficient, the fæces must be removed by a spatula or scoop.

481. 10. *Swelling of the soft parts.*—The late Professor Hamilton was, I believe, the first to notice this state as an obstacle to the delivery of the head. Dr. Campbell observes, "The capacity of the pelvis may be diminished by general tumefaction of its linings, consequent on interrupted circulation, from a detention of the child's head, or from frequent examination. This cause of protraction is one of no ordinary nature, since, unless the case be promptly and energetically atttended to, the result may be calamitous from lesion of structure. Unless a practitioner have had the management of the patient from the commencement of labor, he is apt to view this variety of diminished capacity as arising from original defect in the development of the bones themselves."

482. *Treatment.*—Great relief is afforded by venesection; and, if necessary, small doses of tartar emetic should be administered. Dr. Campbell advises the application of the forceps, if there be room; but if the pains be adequate, I would rather leave the labor to the natural efforts, because of the risk of injuring the passages. If the pains be feeble, we must, of course, expedite the delivery.

483. 11. *Perfect hymen.*—Impregnation is quite possible without injury to the hymen: cases have been recorded repeatedly of women in whom the hymen was found perfect at the time of labor. I myself attended one some time ago. In most cases the membrane yields to the pressure of the head at once; but it may (as in the cases I attended) offer a long resistance; though I am not aware of its having ever been the cause of powerless labor.

484. *Treatment.*—The remedy is very simple; if the hymen do not yield to the pressure of the head after a reasonable time, it must be divided by the scalpel. A very slight incision will suffice, and great care must be taken so to support the perineum, as to prevent the laceration extending beyond the fourchette.

485. 12. *Rigidity of the perineum.*—I mention this among the causes of delay, especially in women of mature age, although I believe it never causes such delay as to give rise to unfavorable symptoms, except when a tough cicatrix has formed after a former laceration.

In ordinary cases of excessive resistance, much benefit will be derived from venesection and tartar emetic, followed by fomentations, or gentle friction with hog's lard. If it be clear from any cause (though such cases must be extremely rare) that the perineum cannot dilate, an incision must be made through the obstacle.

13. *Sanguineous tumor of the labium.*—When this accident occurs before the head is passing through the vaginal orifice, it may speedily assume such a size as will offer a decided obstacle, yet delivery is of course necessary. The question to be decided will be whether to deliver with the forceps first, and then evacuate the tumor, or to open the tumor first and then deliver. I should say that we must be guided by the size of the tumor: if it be possible to deliver without danger of laceration, I should prefer that, and then to allow some time to elapse before incising the tumor. But if it be very large, it will be better to have to deal with an incised wound than a laceration, and we must make sufficient pressure at the time and afterwards, to guard against serious hemorrhage.

486. Other causes have been enumerated as protracting the second stage, as shortness of the funis, prolapse of the uterus, etc.; but though, to a certain extent, they may have such an effect, yet not so far as to give rise to the symptoms of powerless labor. Prolapse of the uterus at the time of labor can only be partial, and must arise from excessive amplitude of the

pelvis: careful pressure around the external orifice will retain it within the vagina, and the child will be expelled naturally. Brevity of the umbilical cord, or its coiling, has also been said to delay the descent of the child, but, I believe, without any reason. Those who supposed this, remedied it by dividing the cord, which I believe to be very rarely necessary.

487. SYMPTOMS.—It is unnecessary that I should do more than allude to the symptoms which arise, when, in consequence of any of these causes, the labor is delayed in the second stage; as I have fully described them under the head of Powerless Labor, from which they differ in nothing, except that we do not so frequently find the character of the pains changed. It is evident that the fault is not in the want or inefficiency of pains, but in the obstacles opposed to them. The symptoms then will be in proportion to the delay, making due allowance for difference of constitution and temperament, and the delay will be in proportion to the extent of the obstruction, assuming that no interference has been attempted.

For some time (from twelve to twenty hours) after the first stage has been virtually or really completed, the labor will go on apparently favorably; but after this, the pains producing no effect, we find that the patient becomes feverish, restless, and thirsty; the pulse rises, the skin is hot, the tongue dry and furred, and the gums and teeth coated with sordes. In some cases, but not always, the character of the pain is changed; the outcry and suffering increased, but the force diminished and the voluntary efforts suspended.

If the patient be neglected, the unfavorable symptoms increase: the abdomen becomes tender, and sometimes tympanitic; vomiting is frequent; the urine is retained; the vagina is hot and tender; the discharge becomes yellow or brown, and perhaps offensive; violent rigors occur, and the patient is irritable and despondent, and ultimately sinks into a delirious or comatose state.

488. PROGNOSIS.—In any case to which we are called, our prognosis must depend upon the actual state of the patient, and the possibility of removing the cause, or the facility with which labor may be terminated by instruments. If called early, before bad symptoms are developed, and the cause of delay be one we can remove, the prognosis will be favorable, as far as delivery is concerned, with a reservation as to the results of the operation necessary for the removal of the cause. If the obstacle cannot be removed, and we are obliged to operate upon the child, there will be, in addition to the usual risk of the operation, something additional in proportion to the difficulty of extraction. If we be not called until serious symptoms appear, the shock of any operation will add much to the patient's danger, and our prognosis should be very guarded. In these cases it should be distinctly stated that, although there is danger to the patient if the operation be attempted, there is much greater danger, or perhaps the certainty of death to mother and child, if nothing be done.

489. *Treatment.*—For each cause of delay I have mentioned the special treatment necessary. I shall, therefore, now merely recapitulate a few general principles. 1. In no case need we interfere when the obstacle can be overcome by the natural powers within a reasonable time. 2. That the less serious the mode of interference the better; so that, if the natural efforts are insufficient, we should endeavor to push the obstacle out of the way; to puncture it; or to remove it. 3. That if the uterine efforts be vigorous, the mere removal of the obstacle will enable them to complete the labor. 4. That in some cases, besides removing the cause of delay, it is necessary to employ extracting force; and, in such cases, the less violent the operation the better; thus the vectis (if effectual) would be preferable to the forceps; the forceps to the crotchet; and the crotchet to the Cæsarean section. 5. But in our estimate of the risk of these operations, we must not omit the

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471. *Treatment.*—We must first allow time to see whether the tumor may not be displaced by the efforts of nature, and also to estimate the effects of pressure upon it, and we shall have time for this before the bad symptoms appear. If the obstacle be insurmountable by the natural powers alone, and cannot be raised above the brim of the pelvis by the hand, we must then puncture the cyst through the vagina, nor are we to be deterred from this on account of the apparent solidity of the tumor, as many such contain fluid. A long trocar should be used, and plunged quite through the parietes of the tumor. If fluid be freely evacuated, we shall have no further trouble with the labor: if it be viscid, and do not pass freely through the canula, the opening must be enlarged.

But suppose the tumor should really prove to be solid, and cannot be pushed above the brim; it is clear that we cannot attempt to extirpate it in such a case, and we must then act upon the child. Version has been proposed, but it appears to me very unsuitable; it adds much to the mother's risk, without increasing in any degree the probability of saving the child; the tumor would offer even a greater obstacle to the passage of the head reversed, than in its natural position.

If the tumor, though solid, be small, perhaps a little additional power might enable the child's head to pass without injury to mother and child, and in such a case the forceps might be used, but I do not think cases suitable for this instrument are frequent.

If all these plans fail, or are unsuitable, there is no resource (except for those who prefer Cæsarian section) but to evacuate the brain, and, if necessary, the contents of the chest and abdomen, and then extract the child.

Dr. Merriman has collected eighteen cases, and it appears "that *twice* the labor was effected by the pains, unassisted by the art of the accoucheur; but one of these women lost her life, and one of the children was still-born. *Five* times the perforator was used after a longer or shorter duration of labor: three of these women died, another recovered very imperfectly, and one got well. *Five* times the labor was terminated by turning the child: all the children were lost, and one only of the mothers recovered. *Three* times the tumors having been opened, the labor was afterwards trusted to nature: two of these women recovered, but the other remained for a long time in an ill state of health: two only of the children were preserved. In *three* cases the tumors having been opened, it was still found necessary to have recourse to the perforator: one of these women died; one remained in an ill state of health for eighteen months, and then sank under her sufferings; the third recovered.

Thus, in 18 cases, it appears that of the women,

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472. With respect to all tumors of the pelvis which have rendered the use of the perforator necessary, I would wish strongly to recommend the induction of premature labor in the next pregnancy, at such a period as shall supersede the necessity of an operation, provided that the size, situation, and density of the tumor continue the same.

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[1] Association Journal, May 27th, 1853, p. 469, from Deutsche Klinik, 1852.

head be very small, there may be comparatively little difficulty; and, on the other hand, if the head be large and the sutures ossified, a very slight diminution in the usual capacity of the pelvis will offer great obstruction. In a practical point of view, we may make three degrees of distortion: first, where the pelvis is sufficiently reduced in size as to offer an amount of difficulty which in some few cases may be overcome by forcible pains, if time be allowed, but which generally require extracting force in addition, there being space enough to allow the use of the forceps. Secondly, where the head is unable to enter the pelvis, or having entered, is tightly wedged in the cavity or impacted, as it is called. In these cases there is not space enough to admit the forceps, nor if they could be introduced, would the head bear the compression necessary to enable us to extract the child alive; there is no resource but to evacuate the contents of the cranium. Thirdly, there are very rare cases of extreme distortion, where the canal of the pelvis is so reduced that it would be impossible to extract even a mutilated child.

495. It is not easy to name the actual diameters answering to each of these classes, because, as I have already observed,. the size of the pelvis must always be considered relatively to the child's head. But this much may be stated, that a living child cannot pass through a pelvis whose small diameter is less than three inches. M. Le Roi fixes upon 3¼ inches, Drs. Osborn and Aitkin 3 inches, Dr Jos. Clarke 3½, Dr. Burns 3¼, Dr. Ritgen 2, Dr. Busch 2½ to 3 inches, as the smallest diameter. It is clear, then, that unless there be a space of full three inches, it would be useless, probably injurious, to use the forceps. In such cases Dr. Simpson proposes to turn the child; and if we are certain of the exact diameter, it may be applicable occasionally, but as a general rule its propriety is not as yet established. In the majority of cases, if it be under this, the case will belong to the second class, in which the perforator and crotchet must be used, provided that there be space enough for the extraction of the child after mutilation. Dr. Osborn states that one inch and a half diameter will be space enough for this purpose. M. Baudelocque conceives that craniotomy is inadmissible when the diameter is only an inch and two-thirds; Dr. Dewees when it is less than two inches; Drs. Hull and Burns think that it may succeed when it is an inch and three-quarters; Drs. Gardien and Hamilton when it is an inch and a half; and Dr. Davis when it is one inch. We must not forget the safety of the mother in our measurements. It may be possible to extract a mutilated child through the smaller of these diameters, but it would be at the expense of the mother's life; and I feel satisfied that if it be much below two inches, the case will come under the third class, and our only remedy be the Cæsarian section.

496. If deformity be suspected, an external as well as an internal examination should be carefully made; if we can reach the promontory of the sacrum and the presentation, we can then estimate the relative size of the head and the brim; if the presentation be beyond reach, we may still be able to ascertain the distance between the sacrum and pubis with tolerable accuracy. In addition there is a peculiarity about the first stage of labor. "Besides the general appearance of the patient," says Dr. Rigby, "we frequently find that the uterine contractions are very irregular; that they have but little effect in dilating the os uteri; the head does not descend against it, but remains high up; it shows no disposition to enter the pelvic cavity, and rests upon the symphysis pubis, against which it presses very forcibly, being pushed forwards by the promontory of the sacrum." There is less difficulty in detecting the disproportion in the cavity or lower outlet, as it is within reach, and on examination during a pain, we find that no progress is made, and during an interval we can perceive that the head is larger than the passage it has yet to traverse.

497. SYMPTOMS. — If the labor be allowed to continue beyond a certain time, we shall have all the constitutional symptoms of powerless labor (except perhaps the change in the pains), because the delay is in the second stage, really or virtually. It is true the head may not be able to clear the os uteri, on account of the obstructions at the brim, but the os uteri becomes softer and dilatable, the pains forcing, and the cry suppressed; all marking the transition from the first to the second stage, and it is never until after this change that bad symptoms set in.

But besides these constitutional symptoms, which I need not recapitulate, other effects not unfrequently result, even where we are successful in delivering the patient. The long and forcible pressure of the head of the child against the soft parts at the brim and in the cavity may be followed by inflammation and sloughing. Thus the lower part of the uterus and the vagina may be seriously injured, and if the slough be deep, the bladder or rectum may be perforated. I have already pointed out the possibility of rupture of the uterus.

The child, too, may suffer considerably: if the head enter the brim and be much compressed, its life may be sacrificed; or partial pressure on any part may fracture one of the bones of the cranium, or give rise to inflammation or sloughing of the scalp.

If the os coccygis be anchylosed, so as to offer a decided obstacle to the passage of the head, it may be broken by forcing it backward, as in Dr. Summer's case,[1] rather than risk the loss of the child.

498. *Treatment.*—If the distortion be slight, it is possible that the extra force which will be exerted may be sufficient after a longer time for the expulsion of the child, and a fair trial should be given. But if the disproportion be so marked that it is evident that the child cannot pass without assistance, or if unfavorable symptoms are present, we ought to lose no time in determining by the degree of deformity to which of the classes (§ 494) the case belongs, and acting accordingly. If it come under the first, and there be space enough, we may try the forceps; if under the second, version or craniotomy, and, if necessary, evisceration, will be our only resource; if under the third, the Cæsarian section. I would caution my junior friends against coming to a conclusion and acting upon it without a consultation.

The greatest care will be necessary after delivery to guard against the consequences I have mentioned. Vaginal injections of warm water should be used twice a day, and externally fomentations and poultices, if necessary. I have found great benefit from the exhibition of small doses of calomel and opium at moderate intervals, or of a full dose of opium at bed-time in these cases.

I shall now proceed to consider in detail the operations to which I have as yet only slightly referred.

[1] Ed. Monthly Journal for Oct. 1850, from American Journal.

CHAPTER IX.

OBSTETRIC OPERATIONS.—1. INDUCTION OF PREMATURE LABOR.

499. Very little need be said as to the importance of obstetric operations: the danger to the mother and child, the circumstances under which they have to be performed, and the little time which is allowed for reflection, or consultation, all point out the absolute necessity of our being prepared beforehand for any case which may occur. If any further inducement were required, I might add, the influence which a successful or unsuccessful operation has upon the reputation of a practitioner, or refer to the fact which the periodicals attest, that a surgeon may be indicted for the results of his operations. But I prefer supposing that a conscientious feeling of our responsibility in undertaking the charge of a case, will be the strongest inducement to the acquisition of that knowledge which is the safeguard of those who confide in us. It is, I believe, an axiom, in which I fully concur, that no operation should be attempted without a consultation, if it be possible to obtain one.

In estimating the dangers of any operation, we must always take into consideration the prevalence of any epidemic. If, for example, puerperal fever or erysipelas be epidemic, the danger of any operation is increased incalculably.

Obstetric operations may be divided into three classes: 1, those which are *not intended* to injure the mother or child, as the induction of premature labor, version, the use of the vectis, and the forceps; 2, those which involve the destruction of the child, but which are *not intended* to injure the mother, as craniotomy, and the cephalotribe; and 3, those in which danger is involved to both mother and child, as the Cæsarian section.

I have said, "not intended to injure," because I would not mislead my junior readers, by leading them to suppose that *any* operation is without danger to both mother and child. They are all dangerous, but in different degrees, as we shall see by and bye, and it should be our earnest endeavor in all cases to limit ourselves to the safest practicable operation.

Now let us examine each in detail.

500. 1. The Induction of Premature Labor for the purpose of saving the life of the infant, of its mother, or of both, though of comparatively modern origin, is an operation of great value in certain cases, and it is one of the few instances of an improved science augmenting the number of operations.

There would appear to be, in the minds of all men, a repugnance to interfere with the natural progress of those great phenomena which ordinarily run a definite and uniform course; and in the present case this objection is increased, because the proposed interference is to remedy one irregularity by another. Accordingly, the first consideration has always been, not the *usefulness*, but the *morality* of the operation. Dr. Denman states[1] that Dr. Kelly informed him "that about the year 1756 there was a consultation of the most eminent men at that time in London, to consider the *moral rectitude* of, and the advantages which might be expected from, this practice, which met with their general approbation." The conclave decided in favor of the morality of such interference, and shortly afterwards the operation was successfully performed by Dr. Macaulay. Subsequently, Dr. Kelly "practised it, and among other instances, he mentioned that he had performed this operation three times upon the same woman, and that twice the children had been born living." So numerous, and, upon the whole, so successful, have been the instances in which it has been tried since Denman's time, that it has taken its place among the regular obstetric operations in the various systems of British writers and teachers.

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[1] Introduction to Midwifery, p. 318, 7th ed. For more minute details and references about these operations, I beg to refer the reader to my Researches on Operative Midwifery.

Dr. Denman's remarks upon the propriety of the operation, as to morals, are so conclusive, that I may be excused if I quote them: "With regard to the morality of the practice, the principle being commendable—that of making an effort to preserve the life of a child, which must otherwise be lost, and nothing being done in the operation which could be injurious or dangerous to the mother, but on the contrary, a probability of lessening both her danger and suffering—I apprehend, if there be a reasonable prospect of success, no argument can be adduced against it which will not apply with equal force against any kind of assistance at the time of parturition; against inoculation, or medicine in general; and, in fact, against the interposition of human reason and faculties in all the affairs of life."

501. In France, however, the proposed operation was by no means so frankly received nor so readily adopted. Certain doctrines of the national Church, or at least the interpretation of them by the Doctors of the Sorbonne, touching the importance of fœtal life, seem to have aggravated the risk of the operation, and to have deterred professional men from making the attempt. The great name and extended influence of Baudelocque were opposed to what he considered (in the case supposed) a crime; and a celebrated teacher recently deceased, Capuron, has stigmatized it as "*un attentat commis envers les lois divines et humaines.*" Even so late as 1827, on the occasion of a memoir presented by M. Coste, demanding if it would be allowable to bring on labor prematurely in females laboring under aneurism of the heart, the Académie Royale de Médécine pronounced the question "*inconvénient et presque immorale.*" It is said, however, by M. Sue, that M. Petit ranged himself on the side of the advocates of the operation, and since then it has been recommended and practised by Stolz, Ferniot, Paul Dubois, Dezeimeris, Burckhardt, Velpeau, Figueira, Coste, etc. I am happy to see, also, that in a report recently made to the Académie de Médécine, by M. Cazeaux, in the name of a commission, it is declared that the operation is not immoral, but justifiable, as being less fatal to the mother, and offering a mode of delivery in contraction of the pelvis, certain hemorrhages, and tumors which are irreducible and irremovable.[1]

The objections of the French authors may be thus summed up:—

1. It is immoral. 2. It is almost impossible to determine the exact relations between the head of the child and the pelvis. 3. The manœuvres necessary for exciting labor are highly dangerous. 4. The uncertainty of all women as to the period of their pregnancy. 5. The difficulty of dilatation of the os uteri at the seventh month. 6. The danger of subsequent disease. Each of these objections will be answered as we proceed. It is quite evident, as M. Marinus observes, that these writers had in view the "accouchement forcé" performed at the seventh or eighth month—a different operation, and one perfectly unjustifiable at so early a period.

502. It has been recommended and practised in Germany by Weidmann, Mai, Siebold (four times), Schilling (once), D'Outrepont (twice), Riecke (twice), Haase (twice), Falco (three times), Vezin (three times), Mende

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[1] Journal des Connoiss. Med.-Chir., 29 Fév. 1852, p. 180.

(four times), Betschler, Froriep, Wenzel, Spiering, Ritgen (thirty times), Carus (twice), Kluge (twenty times), Reisinger, Busch, Naegelè (once), Seulen (once), Neumann (once), Spoendli (once), Hayn (once), Mampe (five times), Rosshirt, Kilian (three times), etc. etc.; but opposed by Stein, Osiander, sen., Bernstein, Ebermaier, Gumprecht, Piringer, Joerg, etc.

In Italy it seems to have met with less opposition; or, at any rate, less aversion has been expressed. Successful cases have been published by MM. Ferrario, Billi, Lovati, Bongoianni, etc. etc.

Paul Scheel in Denmark, Solomon de Leyden and Professor Vrolik in Holland, and M. Marinus in Belgium, have each advocated the practice.

503. So much for the history of this operation, and the difficulties attendant upon its introduction into practice.

As to the origin of it, all writers are agreed in attributing it to the following circumstances:—It has not unfrequently happened that the life of a seven or eight months' child has been preserved by accidental premature labor, in cases where the birth of a child at the full term had been previously found impossible from pelvic distortion. From the complete success of such cases, as regards both mother and child, it was inferred that premature labor, artificially induced, might, in certain cases of pelvic deformity, be employed to supersede an operation (craniotomy) which involved not only the destruction of the child, but considerable risk to the mother. The proposal was not, it must be remembered, to deliver the fœtus artificially, but merely, as was stated by Ritgen, "to communicate a slight but certain impulse," by virtue of which the process of parturition may be carried on and completed by the natural powers.

504. The reasoning of Dr. Denman appears to me conclusive, as to the "moral rectitude" of the operation; the next question, therefore, is as to its *safety* to the child and the mother, confining ourselves for a moment to the consideration of the cases originally proposed to be benefited by the operation.

It is perfectly established that a fœtus is "*viable*" at the completion of seven months of utero-gestation, and many instances are on record of children born at that period living to a good old age. M. Chaussier (of Dijon) and his wife were both seven months' children; his Majesty George III. was also a seven months' child; and M. Foderè relates the case of the wife of a judge, whose pregnancies always terminated at the seventh month. Examples of "viable" infants born at an earlier period are likewise to be found; but I beg to refer to the able work of my friend Dr. Montgomery for further details; concluding, from all the evidence we possess of the viability of seven months' children, that premature labor, accidentally or artificially induced, at the completion of the seventh month, does not involve danger to the child from the immaturity of its growth merely.

As to the actual risk of labor to the fœtus, as ascertained by an estimate of facts, I may adduce the following testimony:—

Of twelve cases mentioned by Denman, the majority of the children were saved. Mr. Barlow reports seventeen cases—six children were still-born, five died a few hours after birth, and six lived. Of Dr. Merriman's ten cases, four children were saved. Dr. Merriman, jun., mentions forty-six cases—sixteen children lived, and all the mothers recovered. Dr. Conquest says, that out of nearly one hundred cases, about half the children were born alive. In Mr. Gregory's case, the child was born alive, but died subsequently. In Dr. Collins's case, the child lived. In Mr. Corry's and Dr. Paterson's cases, the infants were saved. Dr. Hamilton states that "previous to the 26th of January, 1836, the author brought on premature labor in twenty-one individuals, on account of defective apertures, viz., in fourteen, once; in one, twice; in three, thrice; in two, four times; and in one, ten times. Of the forty-five infants thus prematurely brought into the world, forty-one were born alive. The death of the four still-born can be readily accounted for." In the practice of Mr. Moir, and Dr. John Moir, premature labor was induced twelve times on six women. Nine of the infants were born alive, and the cause of the death of the three still-born infants could not be attributed to the operation." Of Dr. F. Ramsbotham's ninety-two cases, forty-nine children were born alive. Dr. Lee saved twelve children in thirty-one cases; in several of which the crotchet was necessary after labor had been induced. The child lived in Mr. Hearne's and M. Spoendl's cases. M. Ferrario saved five children out of six; M. Klugè, nine out of twelve; M. Solomon, thirty-four out of sixty-seven; M. Burckhardt, thirty-five out of fifty-two; M. Siebold, two out of three; M. Mampe, four out of five, the fifth being a shoulder presentation.

Dr. Shippan, in his Inaugural Thesis, presented to the Medical Faculty at Wurtzburg, in 1831, has given a summary of ninety cases; seventy-three children were born alive, but eighteen of them died subsequently. According to MM. Velpeau and Kilian, one hundred and fifteen children were saved out of one hundred and sixty-one cases. M. Figueira has collected two hundred and eighty cases from different sources, in which one hundred and sixty-six children were saved.

We may conclude from these different data, that more than half the children were saved notwithstanding a cause of failure to which I have not yet referred. I allude to the greater frequency of mal-presentations in premature labor, than in labor at the full time. In Dr. S. Merriman's cases, for example, there were eighteen mal-presentations out of the forty-six, only one of which was saved. In ninety-two cases of Dr. F. H. Ramsbotham's, thirteen presented with the breech or lower extremities, and six transverse, making nineteen mal-presentations. In two hundred and forty-three premature cases related by Dr. Arneth, there was one mal-presentation in five, thus confirming the observations of Merriman, Dubois, Cazeaux, M'Clintock, and Hardy, etc. If we could subtract all the cases of mal-presentation, we should find, I doubt not, that the proportion of children lost to those saved by the operation was very much smaller.

505. There is unquestionably *some risk* incurred by the mother, but not more than by an accidental premature labor. After much consideration, Denman concludes that "it is perfectly safe to the person on whom it is performed." We have already seen that Dr. Kelly performed it three times successfully on one person. Dr. S. Merriman seems to think that its safety was rather overrated, but he adds, "at all events, the method in question, if carefully conducted, cannot be more hazardous to the mother, perhaps is much less so, than the operation for lessening the head of the fœtus in utero, and it is incomparably less perilous than the Cæsarean operation, or the division of the symphysis pubis." Out of his forty-six cases, not one proved fatal. Dr. Hamilton observes, "The late Dr. Merriman first called in question the safety of the operation; but the cases on which he formed his doubts on this point were evidently cases of accidental coincidence, for the safety of the practice is now fully established." Dr. Blundell concludes his observations by saying, that "with all its faults about it, the practice is of great value, and there are now living in society individuals whose heads have in this manner been preserved from the perforator." Dr. Moir and his son operated above twenty times, and all the mothers recovered[1] In Mr. Corry's case, the woman recovered rapidly. Dr. Gregory and Dr. Collins each operated once, with safety to the mothers. Dr. F. H. Ramsbotham has had recourse to this operation sixty-two times, and it does not appear that

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[1] Ed. Monthly Journal, July, 1851.

head be very small, there may be comparatively little difficulty; and, on the other hand, if the head be large and the sutures ossified, a very slight diminution in the usual capacity of the pelvis will offer great obstruction. In a practical point of view, we may make three degrees of distortion: first, where the pelvis is sufficiently reduced in size as to offer an amount of difficulty which in some few cases may be overcome by forcible pains, if time be allowed, but which generally require extracting force in addition, there being space enough to allow the use of the forceps. Secondly, where the head is unable to enter the pelvis, or having entered, is tightly wedged in the cavity or impacted, as it is called. In these cases there is not space enough to admit the forceps, nor if they could be introduced, would the head bear the compression necessary to enable us to extract the child alive; there is no resource but to evacuate the contents of the cranium. Thirdly, there are very rare cases of extreme distortion, where the canal of the pelvis is so reduced that it would be impossible to extract even a mutilated child.

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But besides these constitutional symptoms, which I need not recapitulate, other effects not unfrequently result, even where we are successful in delivering the patient. The long and forcible pressure of the head of the child against the soft parts at the brim and in the cavity may be followed by inflammation and sloughing. Thus the lower part of the uterus and the vagina may be seriously injured, and if the slough be deep, the bladder or rectum may be perforated. I have already pointed out the possibility of rupture of the uterus.

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[1] Ed. Monthly Journal for Oct. 1850, from American Journal.

passage of a fœtus at an earlier but still "*viable*" age. In the words of Denman: "It is under circumstances and in situations preventing the successful use of the vectis or forceps, and just compelling us to the fatal measure of lessening the head of the child, that it may be a duty to propose, on a future occasion, the bringing on of premature labor."

The first step is to endeavor to ascertain the size of the fœtal head at different periods of utero-gestation, after the seventh month; in order that, by adapting the diameters of the deformed pelvis to the approximate diameters of the fœtal cranium, we may be enabled to fix upon the moment when they are in correspondence for the induction of premature labor. It is of course impossible to do this in any individual case, but an approximation may be attempted, by taking the measurements in a considerable number of cases at the same periods.

The following table has been thus constructed by M. Figueira:—

Age of Fœtus.	Bi-parietal Diameter.	Occipito-frontal Diameter.	Occipito-bregmatic Diameter.
7th Month.	2 in. 9 lines.	3 in. 8 lines.	2 in. 10 lines.
7½ "	3 "	3 " 9 "	3 "
8th "	3 " 1 "	3 " 10 "	3 " 1 "
8½ "	3 " 2 "	4 "	3 " 2 "
9th "	3 " 4 "	4 "	3 " 4 "

509. To this kind of calculation it has been objected, that we cannot be quite sure of the exact age of the fœtuses measured; and to the practical use of it, that the female cannot be quite sure of the exact period of pregnancy. That this objection has a certain weight, must be admitted; but that it is sufficient to prohibit the operation I cannot believe, for it may always be obviated in practice *by assuming the longest possible period of pregnancy.* If, for example, a patient imagine that she is six months pregnant, but that she may be six and a half, by calculating for the six and a half months, we shall have assumed the largest size to which the fœtal head can have attained; and if labor be not brought on till seven months and a half, we shall also have secured a fœtus of the "*viable*" age.

Ritgen has made another series of calculations which have led to the following practical adaptations:

He says labor may be induced at the

	In.	Lines.
29th week, when the antero-posterior diameter of the pelvis is	2	7
30th " " " "	2	8
31st " " " "	2	9
35th " " " "	2	10
36th " " " "	2	11
37th " " " "	3	0

There is a very slight difference between the tables of Figueira and Ritgen, which may be allowed for in practice. The compression of the fœtal head will also render its diameter less than the subsequent measurement would lead us to suppose.

It will be at once observed that there are two measurements of the pelvis which limit the operation; if the pelvis exceed the greater measurement, the operation is uncalled for; and if less than the least, it will not succeed in saving the child. The smallest of these diameters appears to be about two and a half inches, and the greater three and a quarter. If the pelvis, in its sacro-pubic diameter, be less than the former, a "*viable*" child will not pass; and it is generally admitted that a living child may be propelled through a pelvis whose antero-posterior diameter is three and a half inches. The opinions of different authors accord pretty accurately with this calculation.

510. Another difficulty still remains, what has been put forward as a very serious objection by the opponents of this operation; and that is, the uncertainty of ascertaining the exact diameter of the pelvis in the living subject. Various mechanical contrivances have been proposed by Aitken, Coutouly, Baudelocque, Asdrubali, Chaussier, and others (of which I have spoken in a former part of this work); but in this country they could rarely, if ever, be employed. Nor do I think them necessary; a well-practised finger is, after all, the best pelvimeter, and will yield sufficiently accurate information. But we may go further; for by the aid of chloroform the entire hand may be passed into the pelvis, and a direct measurement obtained by comparing the breadth of the hand across the knuckles with the antero-posterior diameter of the brim. But giving the utmost force to this objection, to what does it amount? As Velpeau justly observes: "If the pelvis be wider than we thought, premature delivery (at or after the seventh month) is accomplished without risk. If, on the contrary, the narrowing be more considerable, the fœtus will certainly perish; but then, had no operation been attempted until the full term, the fœtus would equally have been lost, and the mother would have run greater risk." Besides, much information may be derived from the history of the previous labors of the patient; for it is rarely, if ever, for the first child that the induction of premature labor is proposed. Dr. Merriman remarks, "that the use of the perforator in a former labor is not *alone* to be considered as a justification of this operation." This is undoubtedly true in the present uncertain state of opinion concerning the use of the forceps and crotchet, inasmuch as the latter instrument is frequently used where there is no distortion. But if we are convinced that the perforator was used from the impossibility of otherwise delivering the patient, it might then be an adequate reason; and if it further appeared that her labor had been thus terminated more than once, and for the same reason, the operation would then seem to be imperatively required, and I think that we should be perfectly justified in refusing to undertake the case unless the patient consented.

I have now answered all the six objections put forward by the French, as fairly and completely as our facts permit.

511. 2. *A narrowing of the transverse diameter of the lower outlet*, as it offers a fixed impediment to parturition, may be an equally valid ground, for the induction of premature labor.

512. 3. *Exostosis, or fibrous tumors of the pelvis*, if they offer an impediment to the delivery of a child at term, or at the earliest viable age; as they are solid, and cannot be removed by any operation, will evidently justify the induction of premature labor, or abortion, for the purpose of avoiding the Cæsarian section. Some of the cases related by Dr. Merriman would appear to confirm this conclusion, and the authority of Dr. Ashwell and his practice are in favor of it. Mr. Ingleby concludes that "premature labor may with great propriety be proposed on pregnancy recurring, assuming the delivery of a living child at term to have already proved impracticable, the tumor to remain unchanged, and its excision not deemed expedient."

513. 4. When the *uterus* is the seat of *fibrous tumors*, and impregnation takes place, certain morbid changes occur, involving danger to the mother.

"The tumors soften during the latter months; the increased vascular supply leads to inflammation; unhealthy and imperfect suppuration is established in them, and death occurs soon after parturition." This being the experience of Dr. Ashwell, he has proposed "the induction of premature labor *before that period when the tumors shall be subjected to pressure and contusion from the firm, large, and unyielding gravid uterus.*" Before we act upon this suggestion, however, we must be pretty certain that such pressure is likely to take place, and that the case really demands so serious a remedy. Mr. Ingleby has some valuable observations on this subject.

514. 5. In the cases I have supposed, the safety of the child is the great object of the operation; and they are limited, therefore, to those patients in whom the pelvis, though deformed, is still large enough to permit the passage of a "*viable*" child. But there are cases where *the distortion is so great as to render the passage of a seven months' child impossible*, and others still worse, where *no reduction of a viable child's bulk will enable it to pass.*

I do not see why abortion should not be induced at an early period in such cases. This question was answered affirmatively by Dr. W. Hunter in 1768, and a similar approval has been expressed on the Continent by Foderè, Marc, Velpeau, Stolz, Jacquemier, Chailly, Cazeaux,[1] and Spiegelberg and Scanzoni. The life of the child must inevitably be sacrificed, and the safety of the mother alone regarded; and surely, after the calculations I have adduced, it cannot be pretended that Cæsarian section, the *alternative* in these cases, offers such a chance to the mother and child as would justify our preferring it. "When the pelvis is known to be distorted," says Dr. Aitken, "so as to render the birth of a living child impossible, is it not lawful and proper, to prevent the dangers of embryotomy, to induce early abortion?"

An objection to this extension of the operation has been made by Dr. Merriman and others, on the score that it would be "opening a wide door to the dreadful abuse of the operation." That, in short, by multiplying the examples of inducing premature labor or abortion, we should run the risk of its being performed unnecessarily or for wicked purposes. But so may the fact of its being performed at all, and so may the practice of using ergot of rye for the purpose of exciting uterine contractions. I do not, in truth, see any force in this objection, for such cases are extremely rare; nor do I anticipate any such prostitution of their power on the part of the members of our profession; and beyond the profession, the operation is not likely to be much known. It will, of course, be necessary that the case be thoroughly investigated by more than one person, and the time appropriately chosen.

Mr. Radford, of Manchester, has suggested that by combining craniotomy with the induction of premature labor, in those cases where we are called too late for the fœtus to pass even at an early period, we may avoid the Cæsarian operation.

515. 6. In certain cases of *rupture of the uterus* the cause is almost entirely mechanical. There is some narrowing of the upper outlet, perhaps a projection of the promontory of the sacrum, offering an obstacle to the ready descent of the fœtal head, which is driven forward with great force by the uterine contractions. Under such circumstances, the head may be pushed to one side, and if the tissues be not very firm, it will be driven through them into the cavity of the peritoneum. Recovery from such an accident is very rare, but nevertheless it has occurred; and if the woman

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[1] Midwifery, p. 846.

become pregnant subsequently, a premature delivery may save both mother and child. As the best argument I can employ in favor of this operation in such cases, I may mention that it was adopted successfully by Dr. Collins, when Master of the Great Britain Street Lying-in Hospital. The patient had recovered from rupture of the uterus, and became again pregnant. She was admitted into the hospital in the seventh month of pregnancy, and the membranes were ruptured on the 4th of March, 1832. Labor came on on the 7th, and was completed in ten hours. The patient was delivered of a living child, and recovered. The child, however, lived but two days. The case is perfectly illustrative of the advantages which may be derived from the operation in this class of cases. The mother was saved, and the child at birth appeared likely to live; its death does not seem to have resulted either from its early age or from the labor.[1]

7. In certain cases of *cicatrized vagina*, when the obstacle is extreme and very rigid, and when it is not discovered until pregnancy has occurred, the operation is quite admissible at any period, inasmuch as it would be very doubtful whether the operation for occluded vagina ought to be undertaken whilst the patient is in that condition; and the risk of rupture of the uterus, if we leave the case to nature, is very great. Dr. Oldham has recorded a successful case of this kind, and others have related many cases in which the patient was lost from neglect of this operation.

8. Dr. Denman observes: "There is another situation in which I have proposed and tried with success the method of bringing on premature labor. Some women who readily conceive proceed regularly in their pregnancy till they approach their full period, when, without any apparently adequate cause, they have been repeatedly seized with rigors, and the child has instantly died, though it may not have been expelled for some weeks afterwards. In two cases of this kind I have proposed to bring on premature labor when I was certain the child was living, and have succeeded in preserving the children without hazard to the mothers. There is always something of doubt in these cases, whether the child might not have been preserved without the operation; but as such cases often come under consideration, and as I am disclosing all that my experience has taught me, it seemed necessary to mention this circumstance." Mr. Barlow thinks the "doubt" expressed in the above extract a sufficient ground for negativing the operation; but I cannot agree with him.

9. The question has been mooted, whether it would be right to induce premature labor on account of the presence of *certain diseases caused by or connected with pregnancy*. Denman remarks: "The propriety of this practice has also been considered when women have, during pregnancy, suffered more than common degrees of irritation, and especially when the stomach is in such a state that it cannot bear nourishment of any kind or in any quantity, and the patients are thereby reduced to a stage of dangerous weakness. Presuming that these symptoms are purely in consequence of pregnancy, it may, perhaps, be justifiable to bring on premature labor."

Dr. Merriman relates a case occurring in the practice of a "provincial surgeon of considerable eminence." "The patient was teased with a very severe cough, and her stomach was so irritable as to retain no food whatsoever, nor even opium in a solid form. She had taken absorbents, stomachics, bitters, aromatics, and opiates, without experiencing any relief: liniments, fomentations, and blisters had been extensively applied without benefit, and she was thought to be sinking into her grave, when it was proposed, as a last resource, to bring on premature labor, six weeks before the full time, and the patient was delivered of a living child, and ultimately recovered." A case of fatal vomiting during pregnancy is related by Dr. Johnson in the Lancet, March 3d, 1838, p. 825. "A lady, thirty years of age, soon after marriage ceased to menstruate, and became affected with morning sickness, which symptoms were naturally enough attributed to pregnancy. The sickness, however, gradually became worse, and at last nothing of any kind could be retained on the stomach. Pregnancy was not detected, but the disorder attributed to some disease of the pylorus. The sickness and extreme emaciation were the only symptoms present. After death no morbid appearances were observable in any part of the body. The uterus contained a fœtus about four months old. This patient was literally starved to death." "The treatment pursued consisted in the use of various salines, anti-emetics, counter-irritation, leeches, acetate of morphia sprinkled over a blistered surface," etc. Surely the induction of premature labor in this case would have been justifiable, as affording the mother a chance of recovery.

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[1] The patient was afterwards delivered naturally at the full time. The details of the case will be found in Dr. Collins's Practical Midwifery, p. 255.

Other similar cases are on record, both of fatal vomiting, and of success by means of premature labor; and a case occurred to myself, in consultation with Dr. Maguire, of Castleknock. The patient was a young woman, pregnant of her third child, and at about four months was attacked with incessant vomiting, until her life was rendered intolerable, and her strength utterly exhausted. I never saw such agony in any case. We tried all the usual remedies, with occasional relief, but the vomiting returned, and finding that she could obtain no nourishment whatever, that her bodily powers were worn out, that her pulse was steadily 120, I determined, at the sixth month, to induce premature labor, which I effected by puncturing the membranes and giving ergot of rye. She was delivered of a dead fœtus, recovered rapidly, and has since borne a child at the full time.[1] In another case I followed the same practice, and with success so far that after the fœtus was expelled, the vomiting entirely ceased, but she had been so much exhausted that an attack of diarrhœa carried her off.

It sometimes happens that the *serous effusion* which is usually confined to the lower extremities of pregnant females, is extended to the cavities of the pleura and peritoneum, and as it thus gives rise to a train of severe and perhaps dangerous symptoms, the induction of premature labor may be advisable in some cases, and has been practised by Siebold and Carus. Two such cases are related by Sinclair and Johnson.[2]

Puzos induced premature labor in a case of *strangulated hernia*, to facilitate the operation, and afford a better chance to the child. He saved the child, but the mother died afterwards.

On this part of the question I confess it appears to me almost impossible to lay down definite and general rules; the decision must rest with the judgment of the medical attendants in each individual case.

516. 10. The only exception made by Baudelocque to his condemnation of artificial premature labor, is in those cases of great *uterine hemorrhage* before the completion of the term of utero-gestation, when the child is probably destroyed, and the safety of the mother compromised.

These are all the circumstances which have ever been considered to justify our interference in the manner proposed.

Mode of operating.—Eight methods of exciting uterine contractions have been adopted and recommended by different practitioners.

1. Abdominal frictions and manipulation, with warm baths, etc., have been advised, but they very rarely succeed, their supposed advantage being the absence of unnecessary irritation.

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[1] Churchill on Diseases of Women, Book II., Sect. ii., Chapter ii.

[2] Practical Midwifery, pp. 504, 508

2. Separating the membranes for two or three inches around the os uteri will frequently bring on labor, and as this is a close imitation of natural labor, it has been preferred by many. Dr. Hamilton remarks, "that he is now convinced, from the experience of the last ten years, that if there be a sufficient portion of the decidua separated from the cervix uteri, there is no occasion for the introduction of the open male catheter," *i. e.*, for puncturing the membranes. Dr. Conquest considers it as effectual as the other methods, and much safer for the infant, as saving it from pressure during the pains. If it fail, we can still have recourse to the third plan. Professor Braun, of Vienna, has carried this separation a good deal further. He introduces a well-oiled catgut bougie high up into the uterus behind the membranes, and leaves it there. He says that it always excites pains in from six to twenty hours, and may be removed when the waters escape.[1]

3. The membranes may be ruptured either directly or obliquely. For this purpose Wenzel, Ritgen, Klugè, and others, have invented appropriate instruments; but a female catheter may be used, or a piece of wire, or a canula having concealed within it a spring trocar. Care must be taken to wound neither the mother nor child. This plan was adopted in Mampe's and Spoendli's cases, and, from its greater certainty, it has been preferred by most practitioners. Dr. F. H. Ramsbotham induced premature labor this way in thirty-six cases: sixteen children were born alive, and twenty dead, but two were delivered by craniotomy, and one by version. Dr. Moir, of Edinburgh, states that he had pierced the membranes obliquely at some distance from the os, when separation of the membranes had failed. He and his father had thus operated above twenty times.[2]

4. MM. Brünninghausen and Klugè have proposed and practised, with great success, the dilatation of the os uteri by means of a piece of sponge placed within it, and maintained there by a plug in the vagina. Velpeau's experience of the value of these different plans is thus expressed: "The two latter methods are chiefly practised. By the third, the effect is not always produced; it required three operations in the case related by M. Riecke. The separation of the membranes (the second method) is not sufficient to bring on uterine contractions; as the distension of the cervix is not permanent, the first attempt is rarely successful. Distension, by means of a piece of sponge, as proposed by M. Klugè, is much more certain. The irritation which results is permanent, progressive, regular, and sustained by the plug which is maintained in the vagina. Under the influence of such an excitement, uterine action is soon brought on, and it rarely fails to acquire sufficient energy." It is advocated by Stoltz, P. Dubois, Chailly, and others; and Hayn, of Königsberg, to whose case I have referred, adopted this plan with success: but some authors do not agree with Velpeau in thinking it more certain than rupturing the membranes. Dr. Simpson has been in the habit of adopting this plan for many years without a single failure, and without irritation. He prefers beginning with a tolerably large tent, and introducing a larger one every six or eight hours. Labor generally comes on within a short period, and the first stage is shortened by the sponge. It has, also, the advantage of not rupturing the membranes. Dr. Simpson usually orders tepid water to be thrown up the vagina every hour for the purpose of enlarging the sponge.

5. M. Kiwisch, of Prague, has proposed a plan which seems to me very admirable. He directs a continuous stream of warm water upon the os uteri by means of a long tube suspended from a height of about ten feet, and introduced into the vagina. The pressure pushes up the membranes,

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[1] Med. Times and Gazette, June 11, 1859, p. 606.

[2] Ed. Monthly Journal, July, 1851.

and probably separates them from the uterus, and the combination of this and the warmth rarely fails to bring on labor after eight or ten applications. It may be applied once or twice a day for ten minutes or a quarter of an hour. Dr. Arneth[1] mentions that it has been tried in six cases in the Vienna Lying-in Hospital, and that it succeeded perfectly in all but one. It has been used several times in the Dublin Lying-in Hospital, and succeeded perfectly. M. Paul Dubois has tried it successfully in two cases. In one, labor came on after three applications, and in the other after eleven. Both were cases of contracted pelvis, and about the seventh month, and both women recovered well.[2] Dr. Tyler Smith has published a case in which he induced premature labor by a stream of warm and cold water alternately in four days;[3] and there is another, by Mr. Lacy,[4] of distorted pelvis, in which the douche was successful after using it six times, three each day. Dr. Simpson's plan, of substituting Higginson's syringe, appears to me advantageous, as we can regulate the amount and force of the water, and the apparatus is less formidable. He informs me that he has tried it in several cases with great success. The stream of water should be kept up for five or ten minutes each time, care being taken to limit the escape of water from the vagina. Labor in one case came on the same day, in others it required four or five repetitions of the injection. Dr. Sinclair, of this city, has contrived a double syringe for this purpose, which the operator can work by each hand alternately, and so keep up a continued stream. Dr. Cohen,[5] Dr. Leopold Harting,[6] and Dr. Stultz,[7] introduced a small tube through the os uteri, and directed the steam of water between the walls of the uterus and the membranes: twenty-three cases have been recorded by them. Professor Scanzoni has been equally successful with carbonic acid,[8] and Dr. Simpson with ordinary air.

The profession is now in possession of sufficient experience to pronounce favorably of this plan, and it will probably supersede the other methods, as avoiding all their inconveniences and possessing all their advantages. It preserves the membranes entire, and occasions neither local nor constitutional irritation, and seems peculiarly suited for cases of distorted pelvis, where it is difficult to reach the os uteri.

6. Ergot of rye is now generally believed to have the power of originating uterine contraction, and where it succeeds, it is a very effectual and safe mode of inducing premature labor, because we can preserve to the child the safeguard of the liquor amnii, which is of the greatest importance. Dr. F. H. Ramsbotham has published cases in which it was tried for this purpose. Labor was brought on by its use alone in fifty-five cases, without interfering with the membranes of the os uteri. All the mothers but one recovered; thirty-three of the children were born alive, and twenty-two still-born. Of the thirty-three born alive, five died soon after birth.[9] Dr. Patersen, of Glasgow, and Mr. Heane, of Gloucester, succeeded by this means. We have also seen that Dr. Hoffman found forty-five cases in which it succeeded in bringing on premature labor. Although the medicine appears successful as regards the induction of labor and the consequences to the mother, yet the proportion of children lost is greater than by the other methods; and this must be a serious objection to its use when the pelvis will admit the passage of a viable child.

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[1] Die Geburtshülfliche, Praxis, etc., zu Wien, p. 234.

[2] Moniteur des Hôpitaux, 10 and 12 Feb. 1853.

[3] Med. Times and Gazette.

[4] Lancet, Dec. 4, 1852, p. 517.

[5] N. Zeitschrift für Geburt., 1846, vol. xxi.

[6] Monatschrift für Geburts., 1853, vol. i.

[7] Deutsche Klinik, 1834, Jan. 14th, et seq.

[8] Med. Times and Gazette, Oct. 11, 1856.

[9] Ibid., Jan. 7th and 14th, 1854.

7. Prof. Scanzoni has tried, and in two cases successfully, to bring on premature labor by applying an india-rubber apparatus, like a sucking-pump, over the nipples for about two hours. In one, seven, and in the other, three applications were sufficient.[1] The chief objection seems to be the chance of irritating the breasts, and of failure in exciting uterine action.

8. Dr. Radford has proposed galvanism as a mode of inducing labor in 1844, and Dr. Simpson wrote in favor of it about the same time. The former practitioner has used it four times successfully to induce premature labor in cases of contracted pelvis; in a fifth case it failed. Dr. Barnes and others have also successfully employed it.

It has been suggested, that the application of the extract of belladonna might aid in the dilatation of the os uteri; but independent of the fact being rather doubtful, the practice would be dangerous, in consequence of the active absorption and the development of the poisonous effects of the medicine.

517. An interval, varying from twenty-four to ninety-six hours, generally elapses after the operation, before uterine action commences, which it does sometimes by shivering and feverishness. "Great disturbance in the nervous system," says Dr. Gooch, "is produced by it; severe rigors, rapid pulse, and delirium are the occasional consequences; but these symptoms, proceeding from nervous irritation, do not continue long enough to produce any serious consequences." In many cases these symptoms are altogether absent. The patient will require the same management as after ordinary labor. It will be advisable to have a nurse in readiness, to supply the infant with its natural nourishment, until the mother shall have milk for it.

CHAPTER X.

OBSTETRIC OPERATIONS.—2. VERSION, OR TURNING.

518. The term *version* or *turning*, is applied by midwifery teachers generally to that manual operation by which one presentation is substituted for another less favorable; and, in a more limited sense, to the rectification of certain mal-positions.

For the furthering of one or other of these purposes, it has been known to the profession for a considerable period; but the full benefit of the operation, and the class of cases in which it is useful, are of much later discovery. It is recommended by Hippocrates, Celsus, P. Æginetus, Rhodion, etc.; by the early English authors, as Raynalde, Pechey, etc.; among the French by Ambrose Paré, Guillemeau, Portal, etc.

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[1] Med. Times and Gazette, Oct. 1st, 1853, p. 359.

519. STATISTICS: —

Date.	Author.	Hospital, etc.	Cases of Version.	Total No. of Cases.	References.
1781	Dr. Bland,	Westminster Dispensary,	9	1,897	Merriman's Synopsis.
	Dr. Jos. Clarke,	Dublin-Lying-in Hospital,	48	10,387	Trans. of Assoc., vol. i.
	Dr. Merriman,	London Private Practice,	14	2,947	Synopsis, 4th edit., p. 335.
1816	Dr. Granville,	Westminster Dispensary,	8	640	Report of, p. 25.
1826 to 1833	Dr. Collins,	Dublin Lying-in Hospital,	38	16,414	Prac. Treat. on Mid., p. 73.
1828	Dr. Cusack,	Wellesley Dispensary,	5	813	Dublin Hosp. Rep., vol. v. p. 495.
1832	Dr. Maunsell,	"	2	442	Edin. Journal, No. 117.
1833	"	"	0	416	Dublin Jour. vol. v. p. 367.
1828	Mr. Gregory,	Coombe Hospital,	8	691	Dublin Hospital Report, vol. v.
1834 to 1837	Dr. T. Beatty,	Cumberland-street Hospital,	6	1,182	Dublin Jour. vol. viii. p. 66; vol. xii. p. 278.
	Dr. Reid,		28	5,691	Ranking, vol. iv.
1836 1837 1838	Dr. Churchill,	Western Lying-in Hospital,	11	1,640	See Reports.
	Mr. Mantell,		8	2,510	Amer. Med. Jour., vol. iv. p. 245.
	Dr. Adams,		9	628	Ranking, vol. iv.
1842 to 1845	Drs. M'Clintock and Hardy,	Dublin Lying-in Hospital,	28	6,634	Pract. Obs., p. 181.
1847 to 1854	Drs. Sinclair and Johnston,	Dublin Lying-in Hospital,	47	13,748	Pract. Med., p. 514.
1842 to 1857	Dr. Hall Davis,	Royal Maternity Charity.	35	7,302	On Diff. Labor, p. 271.
	Mad. Lachapelle,	Maison d'Accouch.	155	15,652	Practique des Accouch., p. 198.
Dec. 1799 to July 1811	Mad. Boivin,	Maternité,	218	20,517	Mémorial de l'Art, etc., p. 354.
1808	M. Ramboux,	Clin. de Liege,	1	216	Bull de la Faculté, etc., vol. ii. p. 73.
1825 1826	Dr. Merrem,	Cologne,	3	157	Ibid., vol. xvii. p. 283.
1828	M. Papavoine,	St. Louis Paris,	1	240	Jour. du Progrès de Méd. vol. xiv.
1829	. . . . .	Hotel Dieu, Paris,	2	280	Velpeau, l'Art d'Acc. p. 50.
1830 1831	M. Ciniselli,	Clin. de Pavia,	2	94	Gaz. Méd. de Paris, 1835.
1833	M. Mazzoni,		18	481	Prospetto Ragionato, etc.

Date.	Author.	Hospital, etc.	Cases of Version.	Total No. of Cases.	References.
1834 to 1843	Dr. de Belli,	Milan,	51	2,739	Ranking, vol. iv.
1789 to 1792 and 1801 to 1806	M. Boer,	Vienna,	151	29,961	Die Natürliche Geburtshülfe, etc., vol. i. pp. 72, 148, 237; vol. iii. pp. 62, 130, 245.
	M. Naegelè,	Heidelberg,	22	1,411	Velpeau's Tab. View.
1801 to 1807	G. M. Ritcher,	Moscow,	25	2,571	Synop. Prac. Med. Obstetric, p. 416.
	"	Private Practice,	27	624	
1812 and 1813	E. Von Siebold.	WurzburgHospital,	6	310	Siebold's Jour. für. die Geburtshülfe, etc., vol. i. pp. 114, 576.
from 1818 to 1829	"	Berlin Hospital,	60	2,055	Ibid., vol. iii. to x.
1819 1820	M. Ritgen,	Giessen,	1	180	Ibid., vol. vi. pp. 34, 262.
1814 to 1824	M. C. G. Carus,	Dresden,	29	2,133	Ibid., vol. vi.
	M. Kilian,	Clin. de Prague,	63	2,350	Bull. de la Faculté, etc. vol. xxv. p. 352.
	M. Klein,		216	35,417	Arneth, p. 135.
	M. Bartsch,		40	4,425	Ibid.
1824 to 1827	M. Klugè,	La Charité, Berlin,	19	1,254	Siebold's Journal, vols. vi. vii.
1825	Prof. Andrée,	Breslau,	5	181	Ibid., vol. vi. p. 154.
1825 to 1828	Dr. Brunatti,	Dantzic,	3	380	Ibid., vols. vii. ix.
1825 1826	Dr. Theys,	Trier,	1	49	Ibid., vols. vii. viii.
1826	Dr. Henne,	Konigsberg,	2	156	Ibid., vol. viii. p. 121.
1826	Dr. Voigtel,	Magdeberg,	1	29	Ibid., vol. viii. p. 331.
1827	Dr. Küstner,	Breslau,	6	176	Ibid., vol. ix. p. 92.
1829 to 1832	Dr. Adelmann,	Fulda,	1	166	Ibid., vols. xi. xiv.
1830 to 1832	Dr. Siebold,	Marburg,	8	821	Ibid., vols. xi. xii. xiii.
1833 1835 and 1836	"	Göttingen,	7	504	Ibid., vols. xv. xvi.
	Prof. Schwerer,		188	21,804	Ranking, vol. v.
	Dr. Arneth,	Vienna,	44	6,608	Die Geburtsh. Praxis, etc. p. 71.
1821 to 1842	Dr. Ricker,	Nassau,	2478	304,150	Med. Times and Gazette, Oct. 11, 1851.

Thus we see that the records of English practice yield 71,483 cases, and 247 cases of version, or about 1 in 247; French practice, 40,376 cases, and 451 cases of version, or about 1 in 89½; and German practice, 393,823 cases, and 3393 cases of version, or 1 in 116. The whole number of cases is 505,691, and of version 4133, or about 1 in 122½.

520. It is not so easy to make out a satisfactory table showing the danger of the operation to the mother and child, from the want of details. Many writers do not mention whether any of the mothers died, and some omit the result as regards the child.

In the following table, I have taken all the numbers upon which I could depend, and though the list is not extensive, I believe that the average mortality will be found pretty correct.

Authors.	Number of Version Cases.	Mother lost.	Children lost.
Mad. Lachapelle	155	Not stated.	45
Mad. Boivin	218	Not stated.	48
Dr. Clarke	48	6	35
Dr. Collins	33	8	13
Dr. Cusack	5	0	2
Mr. Gregory	3	0	0
Dr. Beatty	6	1	6
Dr. Churchill	11	0	8
Drs. M'Clintock and Hardy . .	23	1	5
Professor Andrée	5	0	3
Dr. Klugè	7	1	3
Dr. Küstner	6	0	2
Dr. Adelmann	1	0	0
Dr. Boer	26	0	10
Dr. Mazzoni	18	0	7
Dr. Arneth	44	3	14
Prof. Schwerer	183	14	98
Dr. Ricker	2478	176	1431

Thus, in 2939 cases, where the result to the mother is specially mentioned, 212 mothers died, or nearly 1 in 14.

I do not give this result as the exact mortality of the *operation*, because it is evident that the deaths in many cases must have been owing to the *cause* which demanded the operation, as in placenta prævia; but as we find that even in several of these cases the fatal termination was evidently more owing to the operation than to the hemorrhage, I am inclined to think the calculation not very far from the truth. However, any erroneous inference from these statistics will be guarded against by the recollection of the various and serious accidents which require the operation.

In 3347 cases, where the result to the child is detailed, 1472 children were lost, or rather more than 1 in 3.

To a certain extent the same observations apply to this calculation of the mortality amongst the infants, and similar allowance must be made.

521. The *object* of the operation is threefold:—

1. To place the head in a more favorable relation to the pelvis, or to substitute the head for some other presentation.

2. To substitute the inferior extremities for some other less favorable presentation.

3. To hasten the termination of labor, in consequence of complications, as *convulsions*, *flooding*, *prolapse of the funis*, etc.

It has been proposed to turn and deliver instantly, in case of the sudden death of the mother, instead of having recourse to the Cæsarian section: but the mortality amongst children so delivered would preclude this application of the operation.

There is so much difference in the means by which the first and second objects are attained, that it is necessary to say a few words upon each.

522. 1. *Version by the head*, or *cephalic version*, as it is termed, consists (*a*) in clearing the upper outlet of any part which may hinder the descent of the head; (*b*) in seizing the head, and bringing it down to the brim of the pelvis; (*c*) or in rectifying the mal-position of the head.

As the majority of children enter the world head foremost, this mode was decided to be the standard of natural presentation at a very early period, and attempts were made to correct any deviations. Rhodion, Raynalde, etc., endeavored to change footling into head presentations, but not by internal manœuvre. After the discovery by Amb. Paré, Guillemeau, and others, of the ease with which labor could be terminated by bringing down the feet, cephalic version went very much out of fashion. By the great bulk of recent writers (especially in our own country) it is either not mentioned at all, or with reprobation. Still there are cases in which its suitability could not be overlooked, and in consequence we find an admission here and there of its utility. Smellie recommends it in certain mal-positions of the head; Mauriceau advises it if the neck present; and De la Motte, Melli, and Roux speak of success obtained in this manner. Le Roi preferred it generally to version by the feet.

These, however, were only exceptions to the rule: it remained for Flammant, professor at Strasburg, to recall the attention of the profession to the operation, in such a way as to procure its readmission (at least on the Continent) into the number of valuable obstetric operations. His example has been followed by several German and French writers. Labbe, Eckhardt, and Wigand, published successful cases in 1803; Schnaubert in 1815; D'Outrepont and Regnaud in 1825. Busch gave an account, in 1826, of fifteen cases, in which fourteen infants were born living. In 1827 Ritgen collected forty-five successful cases. Riecke has had sixteen cases. It has been eulogized by MM. Vallée, De Roche, Ubersaal, Stoltz, and Toussaint. Jöerg and some others advise the head to be seized and placed in position when nearest the cervix, and Gardien seems inclined to recommend it strongly, "if practitioners were only as well versed in the use of the forceps as the professor of Strasburg."

One of the few British writers who speak well of it, is the late distinguished professor at Glasgow, Dr. Burns, who says: "For instance, if the patient be known usually to have a short labor, if the pains be brisk, the os uteri dilated, or in a relaxed and easily dilatable state, the liquor amnii retained, and the head movable, then the head may, without any difficulty or much irritation, be placed in the proper position, with a fair and reasonable chance of success." I may also cite the testimony of Dr. Dewees, who acknowledges that "should nothing but the position of the head, with a slightly diminished capacity in the antero-posterior diameter, affect the labor, we may sometimes enable the woman to deliver herself, provided the waters have discharged themselves, by the aid of two or three fingers within the vagina, and applied to the side of the head, so as to carry the vertex towards one of the acetabula;"—"when thus placed, we may commit the termination to the natural efforts, provided no other circumstance complicates the labor."

523 It is stated as an *objection* to the employment of this kind of manipulation, that it is more difficult to catch firm hold of the head and to bring it to the upper outlet; that if we succeed in bringing it to the brim we can do no more, but must then leave it to nature, or use the forceps. To these

and similar objections, Velpeau has returned the following answer: "1st, It is not always very difficult to seize the head, and to exert considerable force upon it; 2dly, if the waters have not been long discharged, one may often without difficulty seize the vertex, and bring it to the centre of the brim, however far it may have been distant; 3dly, that in general it is better to force the head to descend, by pushing up the presenting part, than by bringing down the head; 4thly, that delivering by the breech is far from being a simple and safe operation; as regards the child, it is less so than cephalic version, even if the forceps should afterwards be applied."

No one can for a moment deny that there is considerable weight in the objections I have named; but a more detailed investigation will show that they are valid only against an indiscriminate employment of the operation, and not against its use in the cases to which it ought to be confined. These cases may be divided into two classes: 1, where the pelvis is of sufficient size, and nothing but the *mal-position* of the child's head calls for interference; 2, in certain *mal-presentations*, such as the neck or shoulder, and perhaps in a few arm cases, if the uterus be not strongly contracted, and especially if the waters have not escaped. It is evidently not calculated for any case where prompt delivery is necessary.

Its *advantages* are found to be, — first, a greater facility in reaching the head, for it is not proposed to be used in cases where the feet are near the os uteri; and secondly, a vast saving of infantile life. This operation will be no more fatal to the child than natural labor, if performed early, whereas in footling cases and in version by the feet, more than one in three are lost.

[In a prize essay on "Difficult Labors and their Treatment," Professor M. B. Wright, of Cincinnati, states that he has succeeded in effecting cephalic version in cases of shoulder presentation, etc., even where turning by the feet was impracticable. He attributes his success mainly to his manner of proceeding, which is certainly one of the best that has been yet suggested. It consists in returning the arm of the child, should it be prolapsed, and placing it as nearly as possible in its original position across the breast, when the operator is to apply his fingers to the top of the shoulder, with the thumb in the axilla or on such part as will give him command of the chest and enable him to apply a degree of lateral force. Whilst the left hand is applied to the abdomen of the mother over the breech of the fœtus, with the right, lateral pressure is to be made upon the shoulder in such a way as to give to the body of the fœtus a curvilinear movement. The left hand at the same time makes pressure with the view of dislodging, as it were, the breech, and moving it towards the centre of the uterine cavity. The body is thus made to assume its original bent position, the points of contact with the uterus are loosened, and perhaps diminished, and the force of adhesion is in a great degree overcome. Without any direct action upon the head, it gradually approaches the superior strait, falls into the opening, and will, in all probability, adjust itself in a favorable vertex presentation. If not, the head may be acted on as in deviated positions of the vertex, or it may be grasped, brought into the strait, and placed in correspondence with one of the oblique diameters.]

524. 2. *Turning by the feet*, or *podalic version*. — This was known to the ancients, but confined by most of them to the case of dead children. To Ambrose Paré, we are indebted for demonstrating its facility and comparative safety, and for inculcating in practice. His distinguished pupil, Gillemeau, followed in his footsteps, to be himself succeeded by others of brilliant talent and profound research, who cleared up the difficulties, and settled the limits, and laid down the rules for the operation.

The peculiar *advantages* of version by the feet are: —

1. That it gives to the operator the entire control over the whole process

of the labor, so that he can regulate its duration, either acting with, or independent of, the pains.

2. That though inferior in its results to labor with head presentation, it is about equal to any other, and superior to some.

3. That in some cases it is the only chance of saving the child's life, or of avoiding evisceration.

4. That in certain cases it affords a probability of saving the mother's life, when other means are hopeless.

On the other hand, its *disadvantages* are not to be overlooked; for —

1. From the distance the hand has to traverse, and the difficulty of seizing the feet and of turning the child in utero, there must ever be a fearful risk of injury to the mother.

2. The mortality amongst the infants thus brought into the world is very great; as far as our statistics extend, they yield 1472 out of 3347 delivered, or more than 1 in 3.

525. From all that I have said, it will not be difficult to specify the *cases to which the operation is applicable.*

1. It may be used in all cases of *mal-presentation*, whether of the superior extremities or trunk.

2. If, upon the introduction of the hand for cephalic version, it be found impossible to rectify the *mal-position* of the head, we are advised to seek for the feet, and bring them down.

3. In all cases of *placenta prævia*, many cases of *ruptured uterus*, *convulsions*, *prolapsed funis*, etc., the operation is available, and has been used with great success.

4. Dr. Simpson has revived the recommendation of Exton, Pugh, Ould, and Burton, to substitute turning, in certain cases of distortion of the pelvis, for craniotomy, on the grounds that the base of the skull being narrower than the inter-parietal diameter, and the head more cômpressible under tractile than expulsive efforts, the child might be delivered, and perhaps saved by a less severe operation. And further, that as turning might be attempted at an earlier period than is usual for craniotomy in such cases, we might thereby afford the mother greater security of a favorable result to herself. And he has supported his views by statistics taken from Dr. Collins's work, but without sufficient care and caution, as it appears to me.

Now let us examine into the practical application of his proposal. The bi-mastoid diameter in the six cases of measurement he gives, varied from $2\frac{6}{8}$ in. to $3\frac{2}{8}$ in.; and a living child can pass through a pelvis of $3\frac{1}{4}$ in. antero-posterior diameter with or without the forceps. With a pelvis of this size the operation is then unnecessary, and if the antero-posterior diameter of the pelvis be less than $2\frac{6}{8}$ in. the operation would be impracticable. Then these are the limits of the operation: for us to attempt to drag a child through a smaller space would be unjustifiable. For the success of the operation, then, we must *be able to ascertain* that the pelvis is within these limits, and perhaps in some few cases, with whose former labors we are accurately acquainted, we may do this, but in an immense majority of cases it will be, I think, impossible; and it happens, as Dr. Collins has shown, that the greater number of cases of difficult labor he met with were first cases, in which, of course, no such precise judgment could be attained. It is only fair, however, to state that, by putting the patient under the influence of chloroform, and introducing the hand into the vagina, Dr. Simpson has an opportunity of estimating the diameter of the brim more accurately than by any of the ordinary modes of measurement.

Again, the life of the child is not secured and its chance but little increased, even if our estimate of the pelvic diameters be accurate; for if in turning with an ordinary-sized pelvis, rather more than one-third of the children are lost, the mortality will be surely much increased if its diameter be reduced more than one-fourth.

Moreover, if we should miscalculate the size of the pelvis, or if the head should be a trifle larger than usual, so far from the safety of the mother being increased, it would be very seriously diminished; for we must then craniotomize the child after incurring the hazard of turning, and in a most unfavorable position.

Lastly, even if we succeed in selecting a suitable case and in extracting the child, it has yet to be proved that the mother would not incur considerable danger from contusion or laceration in forcibly dragging the child through a narrow pelvis; for I must remind my readers that we have no statistics of the proposed operation to compare with those of the old method, the few cases adduced by Dr. Simpson being of no value for this purpose.

I must therefore object to the *general* adoption of Dr. Simpson's plan, for the reasons above stated: the difficulty of ascertaining the exact diameters of the pelvis, the very little benefit to the child, the great risk to the mother of doubling the operation. At the same time I do not mean to deny that there are some cases in which it may be worth trying, as every successful case is a rescue of a life from destruction. So far as it is applicable, it is one mode of limiting the operation of craniotomy, an object we must all have at heart. In these conclusions I am very glad to adduce the concurrence of Dr. Radford, whose papers are no doubt familiar to my readers in the pages of the Provincial Medical and Surgical Journal.

526. The next point for our investigation is the *period most suitable* for making the attempt; so as not to interfere rashly on the one hand, nor to delay too long on the other, "*neque temerè nec timidè——.*" Of the two errors, it is hardly too much to say, that excessive delay is the more serious.

1. If the case be one requiring *cephalic* version for the rectification of a *mal-position*, it is clear that the operation can only be safely, if at all performed, before the uterine efforts have wedged the head into the upper strait; the attempt should be made so soon as it is evident that the natural powers will not rectify the mal-position. It will be an additional motive for *prompt* assistance, if we find the pains violent, and that the patient have had many children, lest the head, not being able to enter the brim, should be turned aside, and forced through the uterine or vaginal parietes.

2. (*a*) If we are called to an *arm presentation*, or any demanding *podalic* version, before the escape of the liquor amnii, and we find the *os uteri* hard and undilatable, it will be advisable to wait until some change takes place, before we introduce the hand; neither is there any risk worth mentioning, provided we remain with the patient, to operate instantly when the waters break.

(*b*) If we see the patient before the rupture of the membranes and find the os uteri soft and dilated or dilatable, there is no reason for deferring the attempt, if the case require this kind of interference, and great advantage in operating while the uterus is distended. If we act as soon as the os uteri will admit the hand, it is the better time, because we then turn the child as if in a bag of water; and this gives us so clear an advantage that it needs no explanation.

(*c*) If the os uteri be dilatable, the sooner the attempt is made after the escape of the waters the better. Gardien says that the most favorable moment is just when the waters break.

(*d*) After the escape of the waters, we sometimes find the os uteri neither rigid nor much dilated, and the pains moderate. In such cases, no time should be lost; the hand should be introduced into the vagina, and gentle, yet firm and persevering, efforts made to pass it into the uterus. Dr. Blundell says: "In ordinary cases, if the mouth of the womb be as broad as a crown piece, and if the softer parts be relaxed thoroughly, the introduction of the hand is not exposed to greater risks than usual, there seems to be no circumstances preclusive of the operation, and the sooner you commence the better."

(*e*) So far, although these cases are each more serious than the other, yet in none of them has any very great difficulty, either of decision or of execution, been experienced. We are, however, often called to a class of cases where our utmost judgment, patience, and skill will be needed. I refer to those cases of arm presentation, where, in the language of Foster, "the membranes have been a long time ruptured, the waters totally evacuated, and the womb closely contracted around the fœtus, which is then thrust considerably into the pelvis, the parts of the woman being dry, hot, tender, and often in a state of inflammation and tumefaction, especially when unskilful endeavors have been used to extract or turn the fœtus, or to dilate the parts."

In such a case, to force the hand through the os uteri would be to rupture that organ, and cause the death of the woman. It is admitted by all authors, I believe, that the operation must be postponed for a time, and means tried to soften the uterus and suspend its contractions. For this purpose all are agreed in the propriety of taking sixteen or eighteen ounces of blood from the arm, and following up this with a large dose (gtt. lxxx. to gtt. c.) of laudanum. Dr. Collins has proposed another remedy of great value. He says: "In such a situation, where the individual is strong and plethoric, twelve or fourteen ounces of blood should be taken from the arm, and a tablespoonful of the following mixture given every half hour, which I have found exceedingly useful, both in quieting uterine action, and in inducing relaxation:—

℞ Aquæ fontis, ℥vj.
Antim. tartar. gr. iv.
Aceti opii, gtt. xxx. M."

By these means, after the lapse of a short time, we shall find the uterus relax, and the os uteri soften, so that with a little patience, gentleness, and time, we may attain our object. It is very probable, though I cannot speak from personal experience, that the full exhibition of chloroform will render the introduction of the hand under such circumstances much more easy, as it surely renders the operation painless.

3. When the case is one of *placenta prævia* or even of *accidental hemorrhage* (if it demand delivery), it is a general rule to operate as soon as possible. The os uteri seldom offers any resistance, when the loss of blood has been great; and as this loss is necessarily increased by the natural efforts in unavoidable flooding, it is evident that the earlier we deliver, the better for the patient.

If we decide upon trying this operation in *convulsions*, *prolapsed funis*, or *ruptured uterus*, it will be wise to attempt it as soon as the state of the os uteri will permit.

527. *Method of operating.*—This operation is usually divided into three stages: the introduction, the turning, and the extraction. I shall shortly describe these, in each kind of version.

1. *Cephalic Version.*—The rectum and bladder having been previously emptied, the patient is to be placed in the posture most convenient to the operator; some recommend that she should lie on her back, others that she should kneel, or lie on her left side, as in ordinary labor. The latter position is generally adopted in this country. Whichever hand we choose to operate with is to be well oiled or soaped, and then insinuated through the os externum edgeways. Mr. Roberton recommends that the vagina should

be filled with lard previously, and that the left hand should be used.[1] As most men are right-handed, I think the greater facility in using that hand will counterbalance any supposed inconveniences. Great gentleness will be necessary, and, contrary to the advice of some, it would seem better to do this during an interval of pain. When the greater part of the head is in the vagina, it will be necessary to change its direction from that of the axis of the lower outlet to that of the upper outlet. This will avoid all injury to the vagina, and will bring the points of the fingers to about the situation of the os uteri. Through the os uteri (and membranes if entire), the hand is to be insinuated very gradually, in a conical form, and during the interval of the pains; holding still, but not losing ground, when the pain comes on. When the hand is in the womb, if our object be to rectify the position of the head, it should be seized, and placed in one of the oblique diameters of the brim, with the posterior fontanelle corresponding to one of the acetabula—*i. e.*, in the first or second position. If our object be to change the presentation—for example, to substitute the head for a shoulder—we must gently push up the shoulder, and then seizing the head, bring it down to the brim, and place it in the most favorable relation to the pelvis; and it might facilitate the operation if the patient were placed on her hands and knees.

Having now done all that we can by the hand alone, it may be withdrawn, and the further progress of the labor left to the efforts of nature; should these be found inadequate, recourse must be had to the forceps.

528. This is the ordinary method of placing the head in position for descending; but Wigand has stated that it is possible, before the waters have escaped, to change the position of the head, or even the presentation, by external abdominal manipulations. Velpeau confirms this from his own experience, and something similar is stated by Sennert and Martins. Riecke has also related several such cases, and Meissner four quite recently. Dr. Burns, in a note to his ninth edition, states that: "Mr. Buchanan, of Hull, informs me that he succeeded in one instance lately, 'where the left side of the breast of the fœtus lay diagonally over the pelvis, with the head forward,' in bringing the head right, by making the patient kneel and raise the breech, whilst the shoulders were brought as low as possible. The water had not been discharged. The situation of the head, when it came down, was made more favorable by the finger. The child was alive."

A very interesting memoir has been published by Professor Martin, of Jena, on turning by external manipulation alone, founded on thirty-four cases, seven of which occurred to himself. The conditions which render the operation eligible are — 1. The non-necessity for immediate delivery; 2. Mobility of the child, which generally ceases after the discharge of the waters; 3. Absence of great sensibility of the womb or abdomen; 4. Sufficient capacity of pelvis, but a moderate contraction is no counter-indication; 5. A normal activity of pains; 6. The child being alive is a subordinate condition. The mode of operating is as follows: — As long as the os is undilated and the pains irregular, the patient is kept upon the side upon which the part desired to be forced into the pelvis is placed. When the os is dilated, and the waters are expected to escape, the bladder and rectum having been emptied, she is laid on her back, the lower part of the body being somewhat raised. With one hand (warm), continuous and moderate pressure, downwards, is made on that part of the fœtus which lies nearest the os, whilst the rest of the body is pressed upwards. This simultaneous pressure is begun during the interval of a pain, and continued during its commencement, while during the height of this the uterus is firmly supported on every side. After a short pause the manipulation is again commenced; and if the operator's hands become tired, an assistant may support the belly on each side while he rests. If the pains are long absent the patient may be placed on her side, the projecting part being supported by a band or cushion, and this position should be maintained when the head has entered the pelvis. When the manipulations have succeeded, and the head or breech is within the os uteri, the membranes should be ruptured, to secure from further change. The pressure may be sometimes diffused, sometimes special, by the points of the fingers; and it should always be double and simultaneous: downwards of the part we wish to engage in the pelvis, and upwards towards the fundus of the rest; and for this purpose an accurate recognition of the parts of the child is indispensable.[1] It appears that this operation has the support of M. Ritgen's authority, and Dr. Spingler has recorded a case in which he succeeded.[2]

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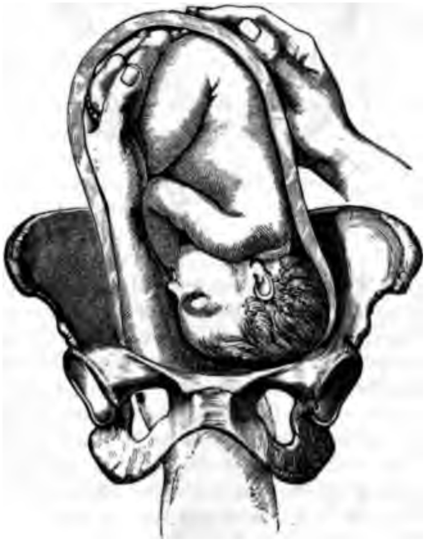
[1] Phys. and Dis. of Women and Midwifery, p. 328.

529. 2. *Podalic Version.*—I shall not repeat what I have said as to the mode of introducing the hand through the os externum and os uteri. The hand and arm of the infant will be our guide; for it is better not to attempt to put it back, much less to separate it, "after the manner of the ancients."

Fig. 110.



Version, or Turning.

Denman remarks: "In no case is it necessary, or in anywise serviceable, to separate the arm of the child previous to the introduction of the hand of the operator. In some cases to which I have been called, in which the arm had been separated at the shoulder, I have found greater inconvenience, there being much difficulty in distinguishing between the lacerated skin of the child and the parts appertaining to the mother. The presenting arm is never an impediment of any consequence in the operation, and therefore, in my opinion, ought not to be regarded, or on any account removed."

Arrived at this point, an examination should be made as to the position of the child's body. Having ascertained all about it, the hand is to be passed over the *front* (chest and belly) of the child, as it is in front that we meet with the feet. It is often a matter of difficulty to reach them, as well from the distance to be traversed as from the contraction of the uterus. This part of the operation should be slowly and gently performed, resting occasionally, and keeping the hand quite still and flat upon the body of the child during a pain, so as to avoid both injury to the mother and great pain to ourselves from the violence of the uterine contractions.

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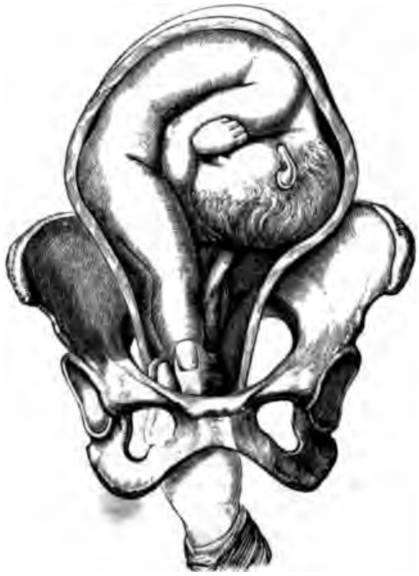
[1] Ranking's Abstract, vol. xii. p. 278, from Froriep's Notizen.

[2] Ibid., vol. x. p. 329.

Fig. 111.



Version, or Turning.

Having found one or both inferior extremities, before we begin to extract we must examine the limbs we hold, and be assured that we have not mistaken a hand for a foot. The feet being held firmly in the hand, must then be brought with a waving motion slowly into the pelvis. While we are withdrawing the hand, the waters of the amnion flow away, and the uterus being somewhat emptied by the evacuation of these, and the extraction of the inferior extremities, we must wait till it contracts, and on the accession of a pain the feet must be brought lower, till they are at length cleared through the os externum.

The *turning* of the child is accomplished *during an interval* of pain, the feet being brought over the front of the child, and not over the back, which would risk dislocation of the spine; and as the feet are drawn down, the head will ascend.

The *extraction* of the child is to be accomplished gradually *during a pain*, and in drawing downwards we should be careful not to place the fœtus in a wrong position as to the pelvis. Some advise us to leave the labor to nature, after turning the child, but to this Dewees rightly objects. He says: "The whole act of turning should be considered as one of necessity rather than of choice; therefore, where it is proper to commence with it, it is, we believe, always proper to finish with it, and not trust the delivery to the powers of nature, after having brought the feet into the vagina, as recommended by some." The case is after this to be managed precisely as a footling case.

530. Throughout the operation I have spoken of bringing down *the feet;* t is now right that I should mention some modifications of this plan.

Peu, Burton, and Wm. Hunter recommended that the hips should be seized and brought to the brim of the pelvis. The latter, in his MS. lectures, says, speaking of arm presentations: "In this case you are to introduce the hand into the uterus, and gently put up the arm, and turn the child to a breech presentation. Reduce it if possible to a *perfect breech case*, that it may come more gradually, on account of the head and the navel-string, lest you strangle the child. If, however, you find this impracticable, let it come footling, but sustain the child at the hips as long as you can, they being, next the head, the largest and most unyielding part." In Germany this plan has been advocated by Schweighauser, Schmidt, and Betschler; it is, however, seldom or never tried. The breech would be more difficult to seize and bring down than the head, and we should (as in cephalic version) lose all control over it, after placing it in position.

531. *Again*, it has been strongly advised to hook down the knees instead of seizing the feet, by Burton, Delpech, and Breen. In this recommendation, Dr. Burns seems to coincide. I shall quote Dr. Breen's own statement of its advantages. "By this proceeding (hooking the finger in the flexure of the knee) the child would be made to revolve on the lesser axis of the trunk, and the foot would be brought into the vagina within the reach of a noose. By adopting a different procedure, and endeavoring to lay hold of a foot according to the usual directions, it is obvious that the hand of the operator must traverse a greater space of the uterus—a matter of very considerable difficulty, either when the action of that viscus is strong, or when it is closely contracted on the body of the child. This difficulty being surmounted, when the foot is laid hold of, it is very apt to slip, and recede from the grasp, as well from the violence of uterine action, as from the hand being cramped and nearly powerless by reason of the previous exertion. By adhering to the direction of hooking the knee, the hand of the operator is in a great measure protected during the pains, and he is enabled deliberately to proportion the force requisite to change the position, to the resistance he encounters. Besides, as the knees must have been nearly in contact with the superior part of the abdomen, from the earliest development of the extremities of the embryo, should what may be called accidental circumstances have removed them from this natural and usual position, but little force will be requisite to restore them to it."[1] Of course, should a foot be nearer the os uteri than a knee, Dr. Breen would advise its being seized.

These reasons certainly appear of sufficient weight to justify the admission of Dr. Breen's suggestions, as an improvement upon the previous mode of turning.

532. *Lastly.* As it is not always easy to seize both feet, we are told by many writers not to be solicitous about the second, but to extract by one alone. The reason given is simply to avoid pain to the mother, and to save the difficulty and trouble of seeking for a second. A similar recommendation has been given by Dr. Radford, of Manchester; but for very different, and, as far as my experience goes, for very valid reasons:—"The results of practice," he says, "prove what might be inferred by reasoning, that the *child's life is much more frequently preserved in those cases in which it presents the breech, than where the feet come down first.*" "Is there, then, no practice which would enable us to bring down a part, approximating in its measurements to those of the breech presentation, which we have already stated to be so safe to the child, but which cannot be affected in turning

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[1] Edinburgh Med. and Surg. Journal, vol. xiv. p. 29.

operations? There is,—and this practice consists in NEVER *bringing down more than* ONE FOOT in the manual operation of turning a child."

The following measurements were obtained from children born at the full period of utero-gestation; —

The circumference of that portion of the head which presents in labor, is from	12 to 13¼ inches.
Do. of the breech, with the thighs flexed upon the abdomen, as in breech presentations, from . . .	12 to 13½ "
Do. of the breech, *with one thigh turned upwards towards the abdomen, the other extended*, from . .	11 to 12½ "
Do. of the hips, the legs extended as in feet presentations, from	10 to 11½ "

It is evident from these measurements, that it will be safer for the child to bring down only one foot, for inasmuch as the breech with the thigh turned up is more bulky than the hip with the legs extended, by so much will the passage be better prepared to admit the quick transit of the child's head, upon which the safety of the infant depends.

Dr. Simpson recommends seizing one knee, and that the opposite to the upper extremity which presents, *i. e.*, if the right arm present, the left knee is to be brought down.

533. From what has been stated, it will appear that the *difficulties* of the operation are almost entirely owing to the uterus being in action. When it is quiescent, or nearly so, the operation is easy; but when the contractions are violent, it is often tedious, difficult, and very painful, both for the patient and operator. These contractions equally impede the introduction of the hand, the finding of the feet, and the turning of the child. Once so much is accomplished, they become of valuable assistance in completing the delivery.

534. The *danger* to the mother may arise — 1. From the operator not changing the direction of his hand, in accordance with the pelvic axes, and consequently pushing his fingers through the vagina.

2. The hand may be forced through the walls of the uterus, if too much force be used in searching for the feet.

3. The uterus may bruise itself against the hand, or the limbs of the fœtus, during the turning.

4. Rupture of the cervix uteri may occur, either during the introduction of the hand or the extraction of the child, especially if the operation be hurried or too much force be used.

5. Without any evident injury, the irritation of the operation may give rise to subsequent inflammation.

6. The nervous shock may be serious, or even fatal.

The simple enumeration of these dangers ought, one would think, to go far towards obviating most of them.

535. The danger to the child consists — 1. *In compression of the funis*, which commences about the time the buttocks appear at the os externum. After this time, if there be much delay, the child will perish from the interrupted circulation, unless by chance the funis should have lodged in the angle at the junction of the os sacrum with the os ilium. To obviate this danger, it was proposed by Pugh to introduce a pipe into the child's mouth, and excite respiration, while the head was yet in the vagina. Bigelow and Baudelocque are said to have employed this in practice.

2. If much extracting force be used, the spine may be dislocated; the hips also; and the leg has been pulled off.

3. Compression of the head is enumerated by Dewees as one of the dangers to which the fœtus is exposed.

536. It only remains for me now to say a word as to the *after treatment.* The patient will probably need an anodyne after the operation, and it is good practice to join a few grains of calomel with the opium or Dover's powder; or a mixture containing sixty drops of laudanum, two drachms of sal volatile in six ounces of camphor mixture, may be ordered, of which a table-spoonful may be taken every two or three hours. It will be necessary to exercise great watchfulness to detect the first inroads of inflammatory action, which must be met by antiphlogistics, according to the strength of the patient, and the violence of the attack.

Careful inquiry should be made as to the character of the lochial discharge each day, and if necessary the vagina be syringed with warm water.

The most absolute quiet and rest are desirable. If the infant be alive, the mother should not be teased with it for some hours.

CHAPTER XI.

OBSTETRIC OPERATIONS.—3. THE VECTIS, OR LEVER.

537. So many claims have been put forth to the invention of this simple instrument, that it is not very easy to trace it to its author. It has been ascribed to Celsus, to Mauriceau, to Schitling, and to Palfyn; but the credit, as far as I can judge, belongs to Henry Roonhuysen, from whom it is extremely probable that Dr. Chamberlen obtained a knowledge of the invention. To others it was also communicated, but "for a consideration;" and the matter was kept secret, until, in 1753, two Dutch practitioners, MM. Jacobus de Visscher and Hugo van der Poll, whose names deserve most honorable mention, and more especially as they did not practise midwifery, conceived the object of making public a discovery which promised such valuable results. They bought the secret for a large sum of money (Baudelocque says 5000 livres de France) of Gertrude de Bruyn, daughter of Jean de Bruyn, and wife of Herman van der Heiden, and immediately published an account of it in the Dutch language, thus terminating the secret history of the vectis.

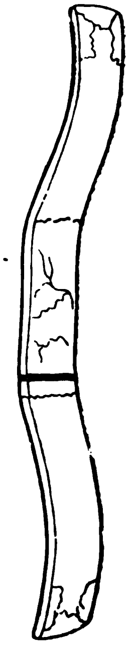
I have not been able to ascertain that the Chamberlens imparted a knowledge of the vectis to any practitioner in this country, although at the time of the publication of Visscher and Van der Poll the forceps was ordinarily used in London. Since then it has obtained more or less notice in works on midwifery, though it has been to a great extent superseded in practice by the forceps.

538. In France, Mauriceau invented an instrument something like the vectis, for the purpose of extracting the head when separated from the body. In 1715, Isaac de Bruas, and in 1738, M. Rigaudeaux, constructed each a vectis, to meet the difficulty of certain cases to which they were called. In 1753, Warroquier, of Lisle, used one blade of Smellie's forceps as a lever. After the publication of Visscher and Van der Poll, the instrument occupied the attention of the profession, who were much divided in opinion as to its merits. At present it is but slightly esteemed.

539. As it was amongst the Dutch the vectis originated, so do they

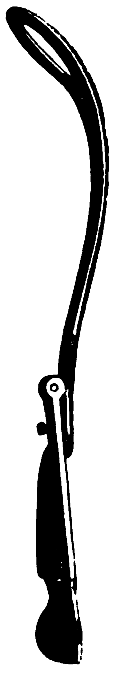
appear to have estimated it most highly, and cultivated it most successfully. In addition to the names of Henry and Robert Roonhuysen, I may mention those of Ruysch, Boekelmann, De Bruyn, Plattmann, Boom, Rooy, De Moor, Visscher, and Van der Poll; of Titsing, Palfyn, Berkmann, Van de Haar, Stylcke, Jans, De Bree, De Bruas, Van Geuns, Rathlaw, etc. Van Swieten, in his Commentaries upon the Aphorisms of Boerhaave, published in 1754, refers to the discovery of this instrument as a benefit conferred on the human race. He remarks: "Quamvis autem egregii viri, qui varios forcipes invenerunt, aut perfecerunt, omnem laudem mereantur, et ob industriam et ob candorem, quo sua inventa publicò communicaverunt, tamen videtur *vectis* ille *Roonhuysianus* reliquis esse præferendus." The celebrated Camper published a paper in 1774, in which he advocated the use of the lever, and spoke highly of its advantages. In 1794, Johannes Mulder published a very learned and valuable history of the forceps and vectis.

Fig. 112.



Roonhuysen's Vectis.

Fig. 113.



Modern Vectis.

540. The Vectis of Roonhuysen is thus described by M. Preville, from the memoir of Visscher and Van der Poll: "L'instrument de Roonhuisen est un morceau long et quarré de fer bien forgé, de 10¾ pouces de long et large d'un pouce: son épaisseur sans être garni est de ⅛ d'un pouce, et étant garni, de ⅜ d'un pouce. Ce fer est droit au milieu de la longueur de 4 pouces, et se courbe insensiblement vers les extrémités. Ces courbures sont à peu près semblables, et étant mesurées dans leur concavités elles ont 3 pouces ¼ de courbure et environ ⅜ de pouce de fond. Ce levier de fer doit être soigneusement arrondi de tous côtées, et principalement aux quatre coins, afin qu'il ne puisse pas faire du mal lorsqu'on l'appuie. C'est pourquoi les extrémités des courbures, quoique bien arrondies, doivent être gar-

nies d'un emplâtre de diapalme étendu sur du gros linge de la longueur d'un pouce en dedans; le morceau droit du milieu situé entre les deux courbures, et par lequel se fait la plus forte pression contre les os pubis, doit être tout à fait garni de cet emplâtre, et un peu plus fort au milieu. Il faut surtout avoir attention que ces emplâtres soient appliqués fort également sur le fer, sans le moindre pli. Après avoir garni le fer de ces emplâtres, on le garnit tout entier de peau de chien mince et fort douce, et il faut observer que cette peau doit être appliquée fort unie, et que les coutures de la peau soient dehors, c'est à dire, du côté convexe de l'instrument." It is added, "Nous avons trouvé une petite corde entortillée autour d'un des bouts de l'instrument, dans l'endroit où la courbure est plus grande, comme on le voit même dans la figure; ce que nous croyons ne servir à autre chose, si non pour marquer qu'on doit se servir de ce côté plutôt que l'autre, ou pour mesurer l'approche de l'instrument."

541. Many changes have been made in the form of the instrument and in the materials of which it is formed. Titsing padded it with wool; Morand and Herbiniaux made it of ivory; others of wood, bone, or silver. "When the vectis was first known in this country," says Dr. Denman, "that described by Heister was preferred to those recommended by the surgeons of Amsterdam. The vectis used by Dr. Cole was like one blade of the forceps, somewhat lengthened and enlarged. That of Dr. Griffith was of the same kind, with a hinge between the handle and the blade; and that of Dr. Wathem was not unlike Palfyn's, but with a flat handle and a hook at the extremity of the handle, which prevents its slipping through the hand, and might be occasionally used as a crotchet. Many other changes have been made in the construction of the instrument, but the vectis now generally used is of the following dimensions: The whole length of the instrument before it is curved is 12½ inches. The length of the blade before it is curved is 7½ inches. The length of the blade when curved is 6½ inches. The widest part of the blade is 1¾ inch. The weight of the vectis is 6½ ounces. The handle is fixed in wood.

The one in ordinary use is that described by Dr. Lowder, and improved by Mr. Gaitskell, who says: "The vectis should be thirteen inches in length, one half to form the handle, the other the curve. The handle should be made of hard wood, rendered rough for the purpose of obtaining a firmer hold, and made to screw on and off. When the instrument is made with a hinge handle, it is very difficult to introduce; therefore this construction of the instrument should never be adopted."

Mr. Ogden has given the description of an instrument which he calls the "tractor-vectis," and which is to be used solely as an extractor. It does not differ very much from the lever in the plate, except that the curve is sharper, and the fenestrum so shaped as to secure a firm hold on the chin or occiput. The oblong diameter of the fenestrum is 1⅞ths of an inch, and the transverse 1⅛th of an inch. The rim encircling this is of uniform thickness, and ⅜ths of an inch wide. It is introduced posteriorly, and its position changed to the right or left, as may be desirable.[1]

542. The *nature of the aid* afforded by the vectis is threefold:—

1. To correct mal-positions, or aid the natural rotations of the head at the brim, or in the cavity of the pelvis; and to this the majority of French practitioners limit its employment.

2. *As a lever* of the first or second kind, *i. e.*, making a fulcrum of the pelvis, or of the left hand of the operator external to the pelvis. Its employment in the first way is extremely hazardous, from the certainty of crushing the soft structures lining the pelvis, and the probability of injuring

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[1] Obstetric Record, Feb. 1st, 1849.

the urethra or the child's head. Many authorities who employ and recom-mend the lever, would altogether reject it, and I think justly, rather than sc use it. This objection does not hold against the second mode, which is the proper one, if it be employed as a lever at all. The discoverers and first possessors of the secret made the arch of the pubis the fulcrum. In order to avoid the urethra, Boom, Boekelmann, and Titsing rested it upon the ramus of the ischium.

3. *As a tractor.*—Dr. Burns says: "It is unfortunately named, for it ought not to be employed to wrench, but to hook or draw down the head; and its proper application would be less apt to be mistaken were it called the tractor." This can only be done with the curved vectis; with the one used by Roonhuysen no tractile power could be exerted. When the force thus employed is sufficient, it is by far the safest application of the instrument, but I confess that I have not been successful in my trials with it.

543. The *cases suitable* for the employment of the vectis appear to be the following:

1. Before the head has fully entered the upper outlet, when, either from slight mal-position, or from very slight narrowing, the uterine efforts are ineffectual in advancing the labor. Froriep advises it in cases of face presentation, and after version, when the head is difficult to extract.

2. It was recommended by its early patrons in cases where the head has become impacted in the pelvis: in fact, it was considered as superseding in a great measure the use of the crotchet. After the description I have given, I need hardly say that it is not merely powerless in such cases, but very likely to be injurious. Levret, and some other French writers, have admitted its employment in some cases where the head was rather tight in the passage—to use their own words—on the point of being "*enclavée,*" but not when impacted.

I have hitherto deferred stating the two principal conditions of its employment, even in these cases, viz., *the presence of labor pains*, without which there could not be a chance of success; and *the dilatation of the os uteri.*

3. The case which appears to be most suitable for the use of this instrument, and in which the probability of success is greatest, is that in which the head, having descended into the pelvic cavity, is arrested in its progress, not by any mechanical impediment, but by the inefficiency (not absence) of
or pains, and when the patient is beginning to show symptoms of consti-
l or local disturbance. This condition does not take place until the
stage of labor has lasted some time, and as, after these symptoms
own themselves, there is danger to the patient in further delay, it is
nt to obtain aid. "In this most favorable presentation," says Dr.
the uterine action is occasionally for hours exerted in vain, from
hich we are frequently unable to account for. Much delay may
ars for the safety of the child, and lay the foundation of a tendency
nmation in some of the soft structures of the mother, indicated by
ne, or several of the following symptoms; increased frequency or
of the pulse; tongue loaded in its centre; secretion of urine dimin-
and becoming higher in color, sometimes requiring to be drawn off
catheter; countenance assuming an anxious aspect; stomach irrita-
general increase of restlessness."

w as there is supposed to be space enough, and pains, though feeble, a
nt additional force will often succeed in bringing the infant into the
ld at once. As there is nothing in the nature of the operation to add
the danger, and especially as the tractile force will probably be sufficient,
seems peculiarly suitable to this case; and I may add, that all the testi-
ony I can collect is in favor of its application.

4. In cases of convulsions, or other accidents occurring during parturition, provided only that the pains continue, the assistance of the lever may be sufficient to terminate the labor.

544. As to the *time* when the instrument may be most advantageously used, I may adopt the words of Mr. Dease: "It requires a certain degree of cool discernment, which I believe is only acquired by long practice, to know when a woman is still capable of assisting her labor, or when the head is sufficiently low in the pelvis to use the extractor." If the object desired be to aid the head in passing through the upper outlet or to rectify its position there, it will be well to operate as soon as the os uteri is dilated or dilatable.

When the head is in the pelvis, it is desirable to have it as low down as may be, as the operation is then much easier. "Under these circumstances," says Mr. Dease, "I think it best to examine the woman as she lies on her side: if the surgeon finds that the head is sunk deep in the pelvis towards the sacrum, at least one half, he may apply the extractor: he should not form his judgment of the descent of the head from examining towards the pubis; for here, from the shallowness of the pelvis, and the swelling of the scalp, he will be very apt to be deceived, and imagine the head to be much lower than it really is."

In coming to a conclusion on this point, however, regard must be had to the constitutional symptoms; if these be urgent, it would be unwise to lose time after the period at which the vectis may be easily applied.

The occurrence of any of the accidental complications will in each case determine the period for operating, according to the urgency of the symptoms.

545. I regret much not having any *statistical results* to submit, but in this, as in too many other cases, practitioners seem to have concluded, that as the instrument is said to be quite safe, it was therefore useless to record the facts.

De Bruyn is said to have used it successfully 800 times in forty-two years. MM. Titsing and Berkmann used it 262 times in twenty-four years, and saved eighty or ninety children in the hundred.

Dr. Copeman has published twenty-four cases occurring in his private practice.[1] All the mothers recovered well, and twenty-four children were saved.

546. As to the *comparative results:* the *alternative* of the vectis is the forceps, and their respective merits have been the subject of controversy with most writers who have treated of them. Upon reading over the different sides of the question, it would seem that each writer has taken up the subject too much as a partisan. To compare their utility in certain cases, is little more than a waste of words; as, for example, where the pains have ceased, or where compression is required to extricate the head of the child. In such cases the vectis is of no use, and it would be highly reprehensible to employ it. But where there is room, and when the pains persist, there the vectis, being sufficiently powerful, has this signal advantage, that there is but the one blade to be introduced, and but the thickness of that one blade added to the child's head. It is possible that the single blade may be able to act where the bulk of two would render extraction impossible. These appear to me to be the peculiar advantages of the vectis, and therefore I shall not detail the controversy more fully, but refer to the works of Osborn, Bland, Denman, Camper, Herbiniaux, Levret, Burns, Conquest, etc., etc.

One point, however, I must notice, which has been urged in favor of the vectis — viz., the secrecy with which it may be used. Now this I consider a decided disadvantage. I most fully agree with the opinion of Dr. Osborn, and shall make no apology for transcribing it at length, as it applies forcibly to all midwifery operations: "In the first place I am persuaded, that if concealment in the use of the means intended for relief in laborious or difficult labors be not permitted, but that the absolute necessity of such means be first established, and that every practitioner be obliged openly and avowedly to use them, we should never again hear or read of one person having used the vectis in 800 and another in 1200 cases (Van Swieten, Camper, and Herbiniaux). Nor shall we again hear of the great number of women which some practitioners are constantly boasting of having delivered; for no man can attend a great number of women in labor, in the manner he ought, in the way nature demands, or a conscientious discharge of his duty requires. Nor do real difficulties occur so often as to render it possible to believe that any man's life could afford such numbers of difficult cases as are stated in the printed accounts from abroad. As I feel thoroughly convinced of the propriety and necessity of a fair and candid avowal of the use of instruments, in every case of midwifery where they are to be employed, so I must insist that their concealment cannot be justified by any proper motive. Such an open avowal implies a conviction in the practitioner's mind of that irresistible necessity for their use that supersedes every other consideration: it implies a consciousness of the rectitude of his conduct, and it implies a voluntary acceptance of the consequences of the operation, which ought to make part of his professional duty: and it clearly demonstrates to the satisfaction of the patient and her friends, that no motive of convenience to himself could urge him to an operation which may prove ruinous to his own reputation and interest. Besides, not to insist upon that responsibility from the operator, is to deprive the patient of the best and surest security against a precipitate performance of the operation. If once the practitioner can rest assured that, let the event of the case be ever so unsuccessful, the injurious effects of his operation will be buried in eternal oblivion, by blending the mischief arising from the indiscreet use of instruments with the natural consequences of labor, he will certainly have nothing to weigh against the tempting advantages of convenience or emolument to himself; but while he is shortening the duration of the most irksome part of his professional duty, the waiting upon a slow and lingering labor, he will flatter himself that, by delivering, he is doing an acceptable service to his patient, in shortening the duration of her sufferings."[1]

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[1] Records of Obstetric Consultation Practice, etc., p. 63, et seq.

547. **Method of operating.**—Premising then that the case is one adapted for the vectis, that there is space enough, that the os uteri is fully dilatable, if not dilated, that there are pains, and that the patient and her friends have been made acquainted with our intention, it next remains for us to consider the method of using the instrument: —

1stly. As a lever, and,

2dly. As a tractor.

1. *As a lever.* — The first point to be decided is, over what part the instrument is to be applied; and here we have latitude enough.

"Some," says Dr. Gooch, "apply it over the occiput; others behind the ear, by which it has a bearing against the prominence of the mastoid process, and others against the chin. The two first are perhaps the best when the head is high, as considerable force is required to move it, which may be employed with more safety against either the occiput or mastoid process than against the chin. But when the head is low down, resting on the perineum, less force will be necessary, and the vectis may then be applied against the chin; but the instrument requires to be used with great caution, lest the jaw should be injured." De Bruyn applied it over the mastoid process; Camper over the lower jaw; Lowder on the forehead, etc., etc.

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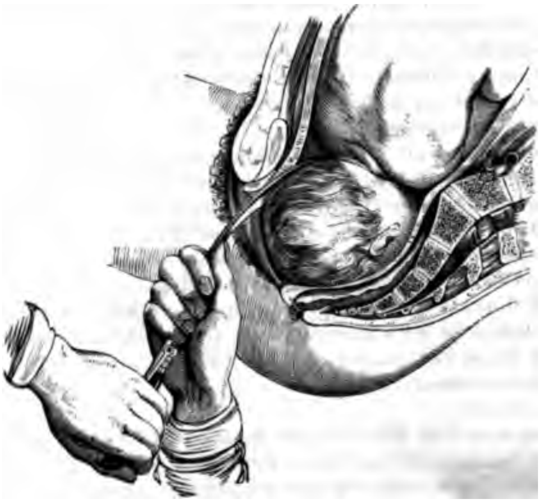
[1] Essays on Midwifery, p. 144.

I have already pointed out the temptation to make the soft parts of the mother the fulcrum, and the mischiefs which result. As far as my judgment extends, it would seem that the vectis ought never to be used as a lever of the first class; even as one of the second class, much caution will be necessary. "When an instrument of this sort is used, it is proper to make the hand the fulcrum on which it acts: now if the force required is but small, this may certainly do well enough, but where great force is required, this is a very bad support; besides, the bony parts of the pelvis lie so convenient, that we may rest our instrument on any part of it. Yet we should recollect, that whatever part we convert into a fulcrum, we injure more or less, according to circumstances. If we apply it over the symphysis pubis, we press upon the urethra; or if in other situations, we shall injure the clitoris or vagina."[1]

"The injuries inflicted, indeed," Dr. Ramsbotham observes, "must have been frequent and great—and this led Peu, in 1772, to suggest the possibility of delivering by the vectis, without making a fulcrum of the mother's structures. He proposed a practice, which is now sometimes adopted, of grasping the shank of the instrument with the left hand—the outer edge of the little finger being applied towards the vulva—making that hand the fulcrum, and pressing the extremity of the blade on the child's head, by raising the handle firmly on the right."[2]

Fig. 114.



Application of Vectis.

Having determined on what part of the infant the lever is to be applied, the instrument is to be well warmed, greased, or soaped, and the patient placed in the usual position for delivery, on her left side; the operator is to introduce one or two fingers of his left hand to serve as a director for the vectis, which is to be carefully and gently passed over the convexity of the child's head, until it has reached the point to which the force is to be applied.

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[1] London Practice of Midwifery, p. 208.

[2] Lectures in Medical Gazette, 31st May, 1834, p. 307. See also Baudelocque, vol. ii. p. 47.

This attained, the handle should now be held firmly with the right hand, while the index and middle finger of the left, fixed about two inches from the screw part, within the vagina, become a fulcrum. On this fulcrum, or *point of support*, the instrument is made to move from the sacro-iliac symphysis towards the hollow of the ilium, by the action of the right hand on the handle. In this way it describes the section of a circle, and glides on to the occiput. Should the occiput point to the right ilium, the left hand must be employed; if to the left ilium, the right hand must be used. When a pain takes place, the accoucheur should gently aid it by drawing down in the axis of the pelvis. In this way the occiput is depressed, while the chin approaches the child's breast, and the head is reduced to the smallest compass, and is thus enabled to pass through the cavity of the pelvis. As soon as the occiput is brought so low as to press on the perineum, the instrument should be withdrawn, and reintroduced with the usual precautions. The object now in view is to place the instrument over the face of the child. To effect this, the hand must be passed up, as at first directed, to the right or left sacro iliac symphysis, according to the situation of the face. When the instrument gets above the brim of the pelvis, a finger or two must be inserted by the side of the instrument, and pressed on till it passes over the forehead on to the face, so as to embrace the chin. The practitioner has now nothing to do but to draw down during the time of pain, increasing the power according to the degree of resistance.[1]

Or if we prefer it, the right hand, grasping the handle, may be made the fulcrum, and the force applied by the left hand at the junction of the blade and handle, directing it downwards and backwards until the descent of the head is accomplished. If the instrument should slip, a fresh purchase must be obtained. As the head passes over the perineum, the efforts may be relaxed, and if the pains appear sufficient, it may be withdrawn altogether, and the termination left to nature.

3. *As a tractor.* The preliminary steps, introduction, etc., are the same as when it is used as a lever; but instead of making use of one hand as a fulcrum both hands are employed in the one office of maintaining a firm purchase, and drawing downwards and a little backwards during the pains. The effort is to be relaxed during an interval; and this alternation of traction and rest is to be continued until the head has descended to the inferior outlet. As before, it may be allowed to pass over the perineum without assistance, if the pains be adequate to its expulsion.

(4.) There is, I believe, no *danger* to the mother or child when the vectis is in skilful hands, but in those of the ignorant or inexperienced great mischief may be done.

1. It may be introduced before the os uteri is dilatable; of this error, contusion, laceration, and death may be the consequences.

2. By an incautious mode of passing the instrument, the parietes of the uterus may be ruptured.

3. By employing the extracting power, without bearing in mind the different axes of the pelvis, and the position of the fœtal head in relation to those axes, the lever will be inefficient, and the mother injured.

4. By passing the instrument outside of the uterus instead of within its cavity, a fatal wound may be inflicted.

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[1] Gaitskell, London Medical Repository, November, 1823, p. 380.

5. By exerting the power without regard to the pains, the operation will be in vain.

6. By making a fulcrum of the soft parts of the mother, much injury may result.

7. By exerting too much force as the head passes over the perineum, or neglecting to support it, you may tear the perineum, so as to lay the genital fissure open to the anus.

8. By making too much pressure with the point of the instrument upon the part of the child to which it is applied, a wound may be inflicted.

549. The subsequent *treatment* varies very little from that required after ordinary labor; there is very little shock, and no injury, if the operation be skilfully performed. The parts should, however, be carefully examined, and, if necessary, a spirit lotion applied. The same treatment should be applied to the head of the child, if the instrument have bruised the integuments.

CHAPTER XII.

OBSTETRIC OPERATIONS.—4. THE FORCEPS.

550. It will be at once admitted, I believe, that the greatest triumph of surgery is to diminish the frequency of operations, and to substitute those of minor severity and danger for others involving more serious risk. If this be true, then it must be granted that the invention of the forceps, and their employment in practice, is one of the greatest improvements recorded in the annals of operative midwifery. Before the introduction of this instrument, the only extracting force at command was obtained by the insertion of a hook into the head of the child; such as is now used in the operation of craniotomy.

This proceeding must of course have been fatal to the child in an immense majority of cases, and the very few who were born alive, must have been subsequently endangered by the mutilating process employed in the delivery. But this was not all; every man possessing common feelings of humanity must have shrunk from the painful necessity of such a proceeding, and have deferred the operation as long as possible, by which the danger to the mother was greatly increased. Now, from this double risk and fearful mortality we have been relieved by the invention of the forceps; for although we are still obliged to destroy the child occasionally, to secure the safety of the mother, yet this class of cases is incomparably smaller than that in which, by the timely application of the forceps, both the child and mother escape injury.

For these reasons, I conceive that I am justified in stating that the invention and employment of this instrument is one of the greatest improvements that has ever occurred in midwifery, even though I may not go the length of certain of its advocates, in asserting that it is entirely without danger to the mother or her infant.

551. It cannot be said that the ancients were altogether ignorant of this

method of extracting the infant, although it does not appear to have been generally known. Mulder, in his valuable work, gives the following extract from a translation of the works of Avicenna: "Oportet ut inveniat obstetrix possibilitatem hujusmodi fœtus, quare subtilietur in extractione ejus paulatim; tunc si valet illud in eo, bene est; et si non liget eum cum margine panni et trahat cum subtilitur valde cum quibusdam attractionibus. Quod si illud non confert administrentur forcipes, et attrahatur cum eis; si vero non confert illud extrahatur cum incisione, secundum quod facile fit, et regatur regimine fœtus mortui." This very distinct allusion to the forceps seems to have made no impression, for we find no similar attempt to extract the child until the middle of the sixteenth century; at which time (1554) Rueff recommended an instrument resembling a pair of lithotomy forceps, for the purpose of extracting dead children, or of supplying a deficiency of manual force. It does not appear, however, that he appreciated the value of the forceps as subsequently employed, nor did his contemporaries carry out his suggestion, for it was not until a century later that the instrument was brought into practice. Before the time of the Chamberlens, it was unknown in England, and even at the time that Dr. Hugh Chamberlen published his translation of Mauriceau, in 1672, it was still a secret. No allusion to such an instrument is to be found in Raynalde's work (1634), nor in the translations of Portal (1705), Deventer (1716), or La Motte (1745).

552. In his preface to the translation of Mauriceau, to which I have referred, Dr. Hugh Chamberlen, after mentioning the method of extracting the child by hooks, observed: "But I can neither approve of that practice, nor of those delays, beyond twenty-four hours, because my father, brother, and myself (though none else in Europe, as I know) have, by God's blessing, and our industry, attained to, and long practised a way to deliver women in this case without any prejudice to them or their infants; though all others (being obliged, for want of such an expedient, to use the common way) do and must endanger, if not destroy, one or both, with hooks. By this manual operation, a labor may be despatched (in the least difficulty) with fewer pains and sooner, to the great advantage and without danger, both of woman and child; if, therefore, the use of hooks by physicians and chirurgeons be condemned (without thereto necessitated through some monstrous birth), we can much less approve of a midwife using them, as some here in England boast they do, which rash presumption in France would call them in question for their lives."

This extract, however, does not fix the date of the invention by Dr. Chamberlen, nor have we any very accurate data for doing so. Through the kindness of a friend, I possess a pamphlet (A Voice in Rhama) by Dr. Peter Chamberlen, published in 1647, in which he speaks of his father's (Dr. Paul Chamberlen) discovery for the saving of infantile life. This would fix the date of the discovery some time before 1647. Of the sons, Drs. Peter and Hugh Chamberlen are the only ones whose names are familiar to us.

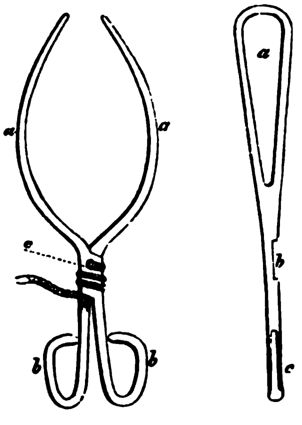
From some vagueness of expression in the extract I have quoted from Dr. Hugh Chamberlen's preface, it was even doubted whether the instrument alluded to was the forceps, but that doubt has been set at rest by Mr. Cansardine, who has published an account of the discovery of Chamberlen's own instruments. "The estate of Woodman Mortimer Hall, near Maldon, in Essex, was purchased by Dr. Peter Chamberlen, some time previous to 1683, and continued in his family till about 1715, when it was sold by Hope Chamberlen to William Alexander, wine-merchant, etc." In an old chest, found in one of the chambers of this house, certain obstetric instruments were discovered, along with "old coins, trinkets, gloves, fans, spectacles," etc., and were presented to Mr. Cansardine, who thus describes them: "First, we have a simple vectis, with an open fenestrum; then we have the idea of uniting two of these instruments by a joint, which makes each blade seem as a fulcrum to the other, instead of making a fulcrum of the soft parts of the mother; and which also unites a power of drawing the head forward. This idea is at first by a pivot, which being riveted, makes the instrument totally incapable of application. Then he goes to work again, and having made a notch in each vectis for the joint, he fixes a pivot in *one only*, which projecting, is to be received into a corresponding hole in the other blade, after they have been applied *separately*. It may be observed, that although there is a worm to a projecting part of the pivot, yet there is no corresponding female screw in the hole which is to receive it. Every practical accoucheur will know, that it is not easy, or always possible, to lock the joint of the forceps with such accuracy as to bring this pivot and hole into opposite contact. This Chamberlen soon discovered, and *next* produced a more light and manageable instrument, which instead of uniting by a pivot, he passes a *tape* through the two holes, and winds it round the joint, which method combines sufficient accuracy of contact, security, and mobility."[1]

There can now be no doubt of the credit of the invention being due to Dr. Paul Chamberlen, and I have proved that it took place before the year 1647. The secret was, however, carefully preserved, nor had it been communicated in the year 1716, for in Dr. Hugh Chamberlen's third edition of Mauriceau, published in that year, the passage I have quoted is continued in the preface.

["The accompanying cut is taken from a drawing of the most perfect of Chamberlen's instruments. No. 1 is the forceps locked: *a*, the blades; *b*, the handles; *c*, the hole in the joint, through which is passed the string to connect the blades.

"No. 2, the front view of a single blade: *a*, the fenestra; *b*, the groove in the shanks forming the lock, by which the two blades, perfectly similar in form, are adapted to each other; *c*, the handle.

Fig. 115.



Chamberlen's Forceps.

"The following are the dimensions: extreme length, eleven inches and a half; length of blades, seven inches and a quarter; of handle, four inches and a quarter; greatest width between the blades, three inches and three-eighths; width between the blades at the points, three-fourths of an inch; greatest breadth of the blade, one inch and a half."[1]]

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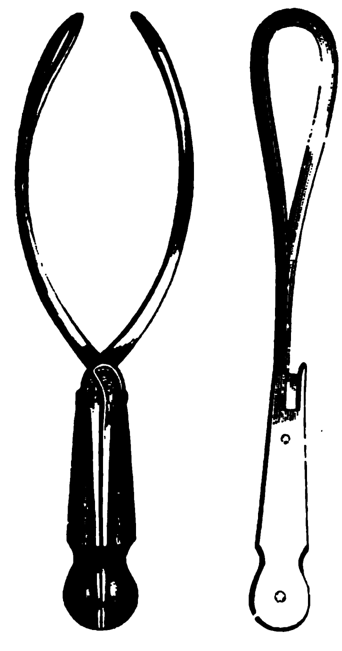
[1] Mr. Cansardine's paper. in Med. Chir. Trans., vol. ix. p. 188.

About this time, or soon after, the secret appears to have been communicated to one or two, for Dr. R. W. Johnson, when speaking of the forceps, says: "Besides these, I have a pair of forceps, which did belong to the late Mr. Drinkwater (late Surgeon and Manmidwife at Brentford), who began practice in 1668, and died in 1728. The size and form of this pair agree with those of Chapman and Giffard, save only that the hooks of the handle are turned outwards."

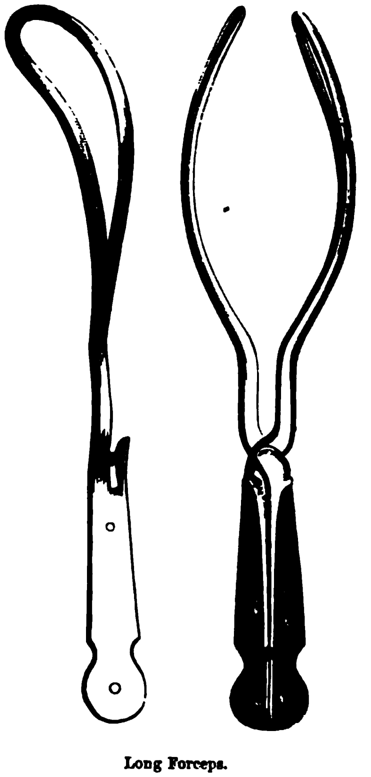
And Mr. Chapman, in 1733, published a description and a plate of the instrument, which he had used from 1726, stating it to be the instrument used by the Chamberlens; but without stating whence he procured it. I have not succeeded in discovering from whom he received it, though from his not claiming the merit of the invention, it is evident that it was communicated to him. He has, however, the great credit of being the first in these countries who published an account of it for the benefit of the profession.

Fig. 116.



Short Forceps.

Fig. 117.



Long Forceps.

After this period, the forceps is described and recommended for various cases by almost all British writers.

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[1] [Appendix to Dr. Ramsbotham's Principles and Practice of Obstet. Med. and Surg.]

553. The credit of first introducing this instrument into French practice is due to Palfyn or Gilles le Doux of Ypres. One of the first persons who used it was M. Duse, whose example was followed by Mesnard, Gregoire, Levret, Coutouly, etc.

The earliest German practitioner who made use of the forceps appears to have been Cornelius Van Solingen in 1673; he was followed by Slevogt, Velsen, Schlichting, etc.

554. The original instrument has been variously modified according to the fancy of different practitioners.

The chief peculiarities may be pointed out in a few words.

1. The most striking variation observable, is in the length of the instrument—some being sixteen or eighteen inches long (fig. 117), and others only eleven (fig. 116). The object of the greater length is evidently to enable us to act before the head has descended into the pelvis. The shorter forceps can only be used when the head is in the cavity. The longer instrument possesses greater lever power, and requires greater skill and care in its management.

2. There is a considerable difference in the distance between the blades of different forceps when closed—some being nearly wide enough to admit an ordinary sized head, whilst others approximate very closely. These instruments must necessarily possess a very different degree of force; with the latter, the head may be powerfully grasped and compressed, and a great extracting force exerted, whereas the former can do little more than extract with moderate force, when the resistance is not great. The latter are the more useful in skilful hands, but the former are perhaps safer for ordinary use.

3. To some of the instruments a second curve is added, the convexity of which is intended to correspond to the hollow of the sacrum, and the concavity to the symphysis pubis, in order that the instrument may be applied in the axis of the cavity and upper outlet. The second curve ("curvatura nova," as Mulder calls it) had been added both to the long and short forceps. I do not believe that it is advantageous in either kind; in the latter it is often very inconvenient. It is far better to have both these instruments perfectly straight, the diversity of curves recommended by different writers answering no useful purpose.

4. The fenestrum varies in length and breadth in different forceps; in some it is altogether absent, and in others it is very wide. The object of the latter modification is to avoid as much as possible adding to the bulk of the child's head, and to diminish the risk of injury to mother and child. I doubt whether the object be attained by this arrangement, and when the forceps are introduced antero-posteriorly, the additional breadth of the blade which is underneath the arch of the pubis, may prove very mischievous to the sides of the outlet.

5. In other forceps the breadth of the blade is continued to the handle, for the purpose of containing an opening, through which the other blade (which is slightly narrower) is passed, so as to insure their apposition.

6. Certain contrivances have been added to the handles of the instrument, to prevent their being pressed too closely together; and in some forceps the blades do not cross, in order to avoid compressing the child's head.

7. The blades have been wrapped with leather, to prevent injury to the scalp of the child. This plan is now very properly abandoned, as it could not be of any use, and rather added to the difficulty of introduction. The blades have also been covered with gutta percha; and Dr. Shekleton informs me that it facilitates the introduction, and he thinks it in several ways an improvement.

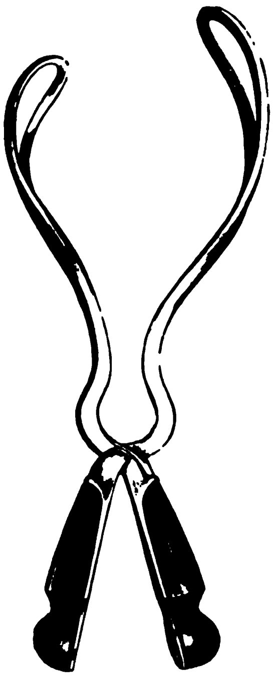
8. Mr. Radford has altered the long forceps, and, as he states, with great advantage. The blade, which is to be applied over the occiput, is much shorter than the other, so that when it touches the neck, the other (owing to the oblique position in which the head descends) will embrace a great extent of the anterior part of the head. He has also lessened the compressing power of the instrument, by placing the joint nearer the outer end of the forceps.

9. Dr. Davis, of University College, London, has shown much ingenuity in varying the forceps, so as to meet the different circumstances in which they are required.

10. Dr. Bond has proposed an arrangement of the joint of the forceps, by which they are permitted a rocking motion upon each other without diminishing the power of the instrument. The handles are Siebold's, and the blades Dr. Davis's, but the lock is Dr. Bond's invention.[1] I cannot speak of the value of the invention, but I do not admire the form of the blades.

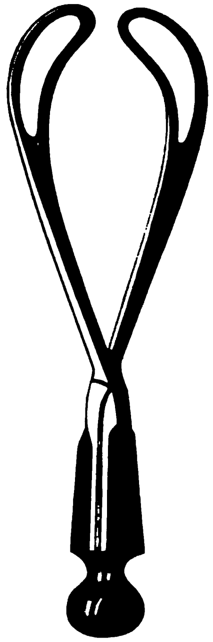
In London, a modification of Levret's forceps is used for the higher operation, and Smellie's for the cavity of the pelvis. In Edinburgh, both the long and short forceps are employed, with the single or double curve. In Dublin, the long forceps is rarely used, and the short one resembles Smellie's, without the second curvature. In France, Levret's forceps, or a modification of it, is in general use. In Germany, the forceps of Boer, Levret,

Fig. 118.



Radford's Forceps.

Fig. 119.



Churchill's Forceps.

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[1] American Journal of Med. Science, July, 1850, p. 70.

Schmidt, Stark, Siebold, Brünninghausen, Naegelè, Osiander, etc.; and in Italy, the forceps of Levret or Assilini are employed.

Since the first edition of this work, I have taken some pains to modify the shape and proportions of the short forceps, and from the testimony of many practitioners, I think I may say that I have succeeded in improving the instrument, although the alterations are but slight (fig. 119). I still prefer the single curved forceps. The length should be 12 inches, of which the handles occupy 4. The interval between the points of the blades when closed should be 1 inch, and at the widest part of the curve 3 inches. The breadth of each blade at the widest part should be 1 inch, the fenestrum 2½ or 3 inches long, having the lower part of the blade solid steel, to give greater firmness. The curve of the instrument should not commence for fully 3½ inches above the handle, and will consequently be much increased towards the point. Lastly, the edges of the blades and fenestra must be nicely bevelled off. The advantages I have found from these changes are an increase of tractile power, without the necessity of grasping the handles so tightly, and compressing the head; the exact fitting of the head into the hollow formed by the curves, so as to avoid distending the perineum by a part of the instrument not actually of use, and the prevention of springing and slipping by the solidity of the lower part of the blades.

The hand that is to use the instrument is, however, of more importance than the instrument itself, of which it may be observed with truth, that "that which is best administered is best."

555. The *object of the operation* with the forceps is,

1. To facilitate delivery, when its progress is arrested by certain malpositions of the head, at the brim, or in the cavity of the pelvis.
2. To supply the want of uterine action, or to render it effective for the expulsion of the child.
3. To save the mother from the evil consequences of a labor too prolonged, and from the necessity of a severer operation.
4. To save the life of the child, or at least afford it a chance of escape from certain destruction.

That these objects are attainable will, I trust, appear from the *nature of the aid* afforded by the forceps, and that they have been in many instances attained, the *statistics of the operation* will prove. It was not for some time after the invention of the instrument that its powers, and the limitations of those powers, were understood. The story of Chamberlen's Paris adventure is a good illustration. He visited Paris, and offered to deliver any patient the faculty chose, with his instrument; they gave him a case of distorted pelvis; he tried, and of course failed, and left the city in disgrace. Had he carefully studied the cases to which the instrument was applicable, he would have been spared the annoyance.

It is evident that the forceps possesses a twofold power.

1. That of grasping and compressing the head of the child.
2. That of acting as a lever of the first kind, and as an extractor.

The compression exercised by it *must* be limited within the degree the head can bear without injury, and *may* be limited by the form of the instrument. The extracting force will be in proportion to the firmness of the grasp, and limited by the resistance, and the danger of injury to the mother. Now it is ascertained, that if there be space sufficient, such a grasp may be obtained of the child's head, without injury to it, as will enable us to extract it, and that the extracting force thus exercised is not sufficient to injure the mother; thus the forces may supply the want of uterine pains.

Many cases occur in which the transverse diameter of the child's head is slightly greater than the antero-posterior diameter of the brim, or the transverse diameter of the lower outlet; but where a slight additional compression would enable it to pass: now, if this do not exceed the amount of compression which the head will safely bear, and if the force required for extraction be not sufficient to injure the mother, such compression and extracting power may be afforded by the forceps, which will thus render the uterine action effective. No doubt it requires great tact and long experience to decide upon the probability of success, but we have high authority for the propriety of the attempt in such cases. To those who lack experience, the failure of a very cautious effort will be a sufficient evidence of its impracticability, and with ordinary care no mischief will be done.

Lastly, in most cases where the head is not impacted, a sufficient grasp may almost always be obtained, either at the upper outlet or in the cavity, to enable us to change the position of the child.

556. Statistics. — I trust I have made it appear, from the nature of the aid afforded, that the first and second objects of the operation are attainable; how far this is the case with the third and fourth must be shown by statistics. But before I give the results of the operation to the mother and child, it may be well to ascertain the average frequency of its occurrence. For these purposes, I have searched all the records within my reach, and the result is the following Tables: —

FREQUENCY OF THE OPERATION.

a. *Among British Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1781	Dr. Bland	1897	12	Merriman's.
1787 to 1793	Dr. Jos. Clarke	10,387	14	Trans. of Assoc., vol. 1.
	Dr. Merriman	2947	21	Synopsis.
1818	Dr. Granville	640	5	Report of West Disp.
1825 to 1833	Ed. Lying-in Hospital	2452	15	Reports.
1828	Dr. S. Cusack	398	1	Dublin Hosp. Rep., vol. 5.
1829	"	303	3	Ibid.
1826 to 1833	Dr. Collins	16,414	24	Prac. Treat. on Midwif.
1834 to 1837	Dr. Beatty	1182	9	Dublin Jour., vols. 8, 12.
	Mr. Lever	4666	9	Guy's Hospital Reports.
1838	Mr. Warrington	88	1	Amer. Med. Journal.
1840	"	110	8	Ibid.
	Mr. Mantell	2410	6	Ibid.
1836 to 1840	Dr. Churchill	1640	8	Researches, etc.
1849	Drs. M'Clintock and Hardy	6634	18	Pract. Obs., p. 95.
1820 to 1827	Dr. Ramsbotham	68,435	112	Obst. Med., p. 720
1842 to 1844	Dr. Murphy	467	4	Rept. of Univ. Col. Hos.
	Dr. Storer	451	8	Amer. Jour., Oct. 1851.
	Dr. Reid	5691	81	Ranking, vol. 4.
	Mr. Earle	4320	82	Prov. Jour., June, 1846.
	Dr. Toogood	1135	15	Ibid., vol. 8, p. 103.
	Dr. Adams	628	14	Ranking, vol. 4.
	Dr. Pagan	8684	82	Glasgow Jour. July, 1853.
	Mr. J. Thompson, Kilmarnock	3300	46	Glas. M. Jour., July, 1855.
	Drs. Johnson and Sinclair	13,748	200	Pract. Mid., p. 163.
	Dr. Hall Davis	7302	6	Difft. Parturition, p. 271.

b. *Among French and Italian Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1797 to 1809	Mad. Boivin . . .	20,517	96	Mémorial, p. 387.
1803 to 1811	Mad. Lachapelle . .	22,243	174	Pract. des Accouch.
1808	M. Ramboux . . .	216	2	Velpeau.
1815 to 1828	M. Pigeotte de Troyes .	1,362	2	"
1819	M. Papavoine . . .	24	1	"
1829	Hôtel Dieu, Paris . .	280	1	"
1830, 1831	Sig. Ciniselli . . .	94	1	"
1834 to 1843	Dr. de Belli . . .	2,739	62	Ranking, vol. 4, p. 184.

c. *Among German Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1801 to 1807	M. Ritcher, Moscow .	3,195	49	Velpeau.
1811 to 1827	Moschner and Kursak, Prague . .	12,329	120	Siebold's Jour., vol. 9
	M. Boer, Vienna . .	29,961	119	Arneth, p. 134.
	M. Klein	35,417	730	Ibid., p. 135.
	M. Bartsch . . .	4,425	61	Ibid.
	Prof. Schwerer . .	21,804	194	Ranking, vol. 5.
1812 to 1818	C. v. Siebold, Wurtzburg.	318	26	Siebold's Jl., vol. 1 to 3.
1817 to 1826	" Berlin .	1,634	212	Ibid., vols. 8 to 8.
1827 to 1829	E. v. Siebold, Berlin .	491	77	Ibid., vols. 9 to 11.
1829 to 1833	" Marburg .	844	34	Ibid., vols. 10 to 18.
1834 to 1837	" Göttingen .	507	37	Ibid., vols. 15 and 16.
1825 to 1827	Dr. Kilian, Prague . .	2,350	120	Velpeau.
1808 to 1814	Dr. Henne, Copenhagen .	555	1	Siebold's Journal, vol. 2.
1826	" "	130	4	Ibid., vol. 8.
1821 to 1825	Dr. Riecke . . .	219,303	344	Velpeau.
1819, 1820	Dr. Ritgen, Giesen . .	180	20	Siebold's Journal, vol. 6.
1825	Dr. Merrem, Cologne .	142	5	Ibid., vol. 7.
1814 to 1827	Dr. Carus, Dresden . .	2,908	184	Ibid., vol. 9.
	Dr. Naegelè, Heidelberg.	1,411	22	Velpeau.
1825, 26, 27,	Dr. Klugè, Berlin . .	809	55	Siebold's Jour. vols. 7,8,9.
1825, 1826	Prof. Andrée, Breslau .	351	8	Ibid., vols. 7, 8.
1825, 26, 27,	Dr. Brunatti, Dantzic .	284	22	Ibid., vols. 7, 9.
1825, 1826	Dr. Theys, Trier . .	49	3	Ibid., vols 7, 8.
1826	Dr. Voigtel, Magdeberg..	29	8	Ibid., vol. 8.
1827, 1828	Dr. Küstner, Breslau .	870	8	Ibid., vols. 9, 10.
1830, 31, 32,	Dr. Adelmann, Fulda .	170	7	Ibid., vol. 14.
1797 to 1837	Dr. Jansen, Ghent . .	18,365	841	Med. Gazette, March 6, 1840. Schmidt's Jahrbücher.
1847 to 1849	Dr. Arneth, Vienna . .	6,608	45	Die Geburtsh. Praxis, p. 92.
1821 to 1842	Dr. Ricker, Nassau . .	304,150	4223	Med. Times and Gazette, Oct. 11, 1856.

Thus among British practitioners we find 594 forceps cases in 147,645 cases of labor, or about 1 in 249.

Among the French, we have 339 forceps cases in 47,475 labor cases, or about 1 in 140.

And among the Germans, 7074 forceps cases in 755,593 labor cases, or about 1 in 106½.

If we add the whole together, we find 8007 forceps cases in 850,713 cases labor, or about 1 in 106¼.

RESULTS OF THE OPERATION TO MOTHER AND CHILD.

Authors.	Number of Forceps Cases.	Mother lost.	Children lost.
Dr. Smellie	52	2	9
Mr. Perfect	18	2	4
Dr. Jos. Clarke	14	2	Not stated.
Dr. Merriman	21	0	6
Dr. Granville	5	1	Not stated.
Dr. Ramsbotham	140	4	"
Edinburgh Lying-in Hospital	15	Not stated.	5
Dr. Maunsell	4	0	1
Dr. Beatty, sen	111	0	0
Dr. Gooch	6	1	0
Dr. Ashwell	6	Not stated.	3
Mr. Warrington	1	0	0
Dr. R. Lee	42	3	31
Dr. Collins	24	4	8
Dr. Thos. Beatty	8	0	5
Dr. Churchill	9	0	0
Drs. Hardy and M'Clintock	18	5	8
Dr. F. Ramsbotham	78	8	17
Dr. Murphy	4	0	1
Dr. Pagan	82	9	19
Dr. Roberton	48	0	7
Dr. Storer	8	0	3
Mr. J. Thompson	46	0	2
Drs. Johnston and Sinclair	200	11	29
Mad. Boivin	96	Not stated.	20
Mad. Lachapelle	79	14	23
Dr. Boer	19	2	5
Dr. Siebold	812	11	47
Dr. Ritgen	20	8	4
Dr. Andrée	8	1	4
Dr. Brunatti	23	1	6
Dr. Voigtel	8	0	0
Dr. Küstner	8	2	1
Dr. Adelmann	7	1	1
Prof. Schwerer	194	7	48
Dr. Arneth	45	7	14
Dr. Ricker	4228	93	684

Now if we add together the number of forceps cases where the result to the mothers is stated, we shall find, that of those detailed by British practitioners, of 812 forceps cases, 38 mothers were lost, or 1 in 21⅓.

Amongst the French and Germans, in 4941 cases, 142 mothers were lost, or about 1 in 34.

Whilst of the children, the British statistics give 142 lost in 694 cases, or about 1 in 5; and foreign statistics 858 in 5037 cases, or about 1 in 5¾.

The total result is, that in 5753 forceps cases, 180 mothers were lost, or about 1 in 32; and in 5731 cases, 998 children were born dead, or about 1 in 5.

To those who, like myself, regard the wider employment of the forceps as the best mode of diminishing the frequency of the employment of craniotomy, it is a matter of rejoicing to find this instrument increasingly employed, and that with each enlargement of our statistics, the death-rate for mother and child has diminished.

I am unable to explain the greater proportional frequency of operations in some of the German reports, except by supposing that their hospitals, being on a small scale, are reserved for the worst cases met with in extern practice among the poor. Were I quite sure of this being the case, however, I should have omitted them from Table I., as they would then manifestly be an unfair record of the proportional frequency of the operation.

It would be unjust to compare the frequency of forceps cases among the Germans and British, without recollecting the minor degree of mortality amongst the children in the practice of the former, and the very much smaller number of crotchet cases. It would seem, that although the Germans use the forceps much more frequently than we do, they often thereby avoid a much more fatal operation.

The rate of mortality exhibited by the last Table is undoubtedly an overestimate, as many of the deaths included in it were unconnected with the operation; but as this is not stated, except by a few authorities, though probably equally true of all, I have preferred quoting the numbers given, and appending this note.

If it were possible to collect a sufficient number of cases from private practice, I have no doubt that our estimate of the value of the forceps would be at once truer and much more favorable. For example, Dr. Beatty's cases in the foregoing table occurred chiefly in private or consultation practice, and we find that in 111 cases he lost neither mother nor child.

Mr. Crosse used the forceps in 23 cases; the mothers all recovered: 7 children were still-born, and 3 died soon after birth.

I can add to these 65 operations either in consultation or in my private practice; out of these 2 mothers died subsequently of puerperal fever, which was epidemic at the time; in both the operation was extremely easy and quick. All the children were saved but six: of these one was putrid, one had the funis prolapsed, one occurred in a case of convulsions, two breathed but soon sank, and one was dead-born.

It is greatly to be regretted, that the statistics of the result of the operation to the mother and child are so limited. Many writers who have carefully recorded the *number* of operations, have very carefully omitted to state whether the mother recovered, or the child was saved, leaving us to make the inference that both were saved. But we know that such an inference would be incorrect. Can any one believe, that whilst British practitioners lose one woman in twenty-one, Mad. Boivin and M. Baudelocque lost none at all? I have, therefore, omitted or marked in the latter Table, all those who have neglected to state the results.

[In a very elaborate paper on "the more frequent use of the Forceps as a means of lessening both maternal and fœtal mortality, by Mr. Philip H. Harper, read before the Obstetrical Society of London, June 1st, 1859, the author has endeavored to show, and we think that he has succeeded in so doing, that there is no especial maternal risk which necessarily attaches to the use of the forceps, and that the various injuries and other ill effects which are usually attributed to them, are not the result of their use, but of their abuse. That when maternal death occurs after their use, it is generally the result of the length of time the labor has lasted before their application. That so long as they are applied as the last resort in tedious labors, so long will the maternal mortality after their use appear to be very high. The author of the paper shows from the only statistics which furnish the necessary data, that *one* mother in *twenty-two*, and *one* child in *five* died in cases of unassisted tedious labor, whilst *one* mother in *fifty-six* and *one* child in 8.4 died where the forceps were used, and *one* mother in *ten* died after craniotomy. Showing that the maternal risk is less after the use of the forceps than after craniotomy or even unassisted tedious labor.

The author endeavors also to prove that we may safely avail ourselves of the power of these instruments as compressors within certain limits, if they are used early and properly applied. That there are a large number of tedious labors, from abnormal or diseased action of the uterus itself, where they are most valuable, and where they ought to be most freely used, and that the period for their use is early in labor, as soon indeed as the os permits, and long before the maternal system has begun to suffer, either locally or generally.[1]]

557. If we fail in our endeavors to extract the infant with the forceps, we have no resource but to employ the perforator and crotchet; and, therefore, in estimating the *utility* of the forceps, we must also compare it with its *alternative* operation, inasmuch as every successful case of the former may be considered as so much gained from the latter.

Now, in craniotomy all the children are destroyed, and one in five of the mothers is lost; whereas we have seen, that by the forceps we save four out of five of the children, and twenty out of twenty-one of the mothers. If we had more minute reports, the success would undoubtedly appear much greater.

558. The special *advantages* of the forceps are said to be:

1. That they are easily applied.

2. That their powers are calculated to attain the object for which they are used.

3. That they do this by imitating the natural powers.

4. That they aid the expulsive efforts of the uterus better than any other instrument, and supply their place, which no other instrument can.

5. That they are less liable to slip than the vectis.

6. That they are attended with less fatal consequences than the perforator and crotchet.

On the other hand, those writers who have defended the use of the vectis, as compared with the forceps, have enumerated several *disadvantages* of the latter — such as,

559. 1. The difficulty of their application in all cases, and in some, the impossibility of using them, owing to the position of the head or want of space.

That the introduction of two blades may be more difficult than that of one, in *certain* cases, is very evident, but that there is much greater difficulty in introducing the forceps than the vectis, in the majority of cases proper for its use, I do not believe. The latter part of the objection is of no force, because those cases where the introduction of the instrument is impracticable are not cases in which its employment is contemplated, and, undoubtedly, if the impaction were so great as to prevent the application of the forceps, it would more surely render the vectis impotent.

2. The risk of bruising the os uteri in the application of the forceps.

I do not think that there is much risk, if the operator be a competent person. Dilatation or dilatability of the os uteri being an essential condition of the operation, the supposition would involve great want of skill and care in the operator.

3. That when the forceps are applied, they are apt to slip and lose their hold.

This may sometimes happen, but it is much more likely to occur with the vectis.

4. That the pressure upon the child's head may destroy life.

No doubt; but as the pressure is regulated by the resistance, this ought never to happen, except in cases in which the crochet must otherwise be used, and in which the vectis would be powerless.

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[1] [See Transactions of the Obstetrical Society of London, vol. i., 1860, p. 142.]

5. That by adding to the volume of the head, they are apt to lacerate the perineum.

That the compression exercised upon the head of the child is amply sufficient to compensate for the additional bulk of the blades, there can be no doubt, even in those cases where the extraction is most easy; but we have an additional safeguard in the removal of one of the blades just before the head passes over the perineum.

6. That as they can never be used secretly, they have a tendency to alarm and intimidate the patient, and in this respect are inferior to the vectis.

When speaking of the vectis, I mention its secret employment among its disadvantages; and I now quote this objection, for the purpose of entering once more my earnest protest against the employment of any instrument secretly.

[The forceps and vectis are calculated for different cases. Under some circumstances one, and under some the other is to be preferred. When the object is merely to change the position of the head, to facilitate its rotation, or to apply a very moderate degree of extractive force, the vectis answers very well; but whenever much traction is necessary, or the head is high up in the pelvis, it is nearly useless.]

560. Having now given the history of the operation, stated its objects, and shown that they are attainable, from the nature of the aid afforded, and from numerical calculation; and, having enumerated the positive and comparative advantages of the operation, with the objections that have at different times been made to the use of the instrument, I shall next proceed to mention the *cases to which the forceps has been considered applicable.* I would wish, however, that it should be remembered, that as I am not writing the history of my own experience only, but that of others, so I am not to be considered as necessarily the advocate of the forceps in all these cases. I have selected them from authors of the highest authority, and their evidence is altogether independent of support from me.

I must also premise, *that in no cases is the forceps* (or, indeed, any instrument) *to be applied, until we are perfectly satisfied that the obstacle cannot be overcome by the natural powers, with safety to the mother and child.* This limits the operation in one direction: *the other limit is determined by the impossibility of extracting the child without laceration or serious contusion of the soft parts in the pelvis,* as this would involve great injury and peril to the mother without saving the child, as the compression involved would almost certainly destroy it. As a general rule, if the child be dead, craniotomy is preferable to the forceps.

1. When the head is unable to enter the brim of the pelvis from malposition (suppose with its long diameter corresponding to the antero-posterior diameter of the upper outlet), which is not rectified by the pains, the long forceps may be applied to change the position, provided the os uteri be fully dilatable, and that the change cannot be made by the hand alone.

2. When the head is in the upper outlet, fitting closely, but not impacted, and the pains are inadequate to overcome the resistance, a little help with the forceps, applied laterally or obliquely, will often overcome the difficulty.

3. When the head, presenting at the brim, is somewhat too large for the antero-posterior diameter of the pelvis, if the excess be not more than may be remedied by the allowable degree of compression, the operation may be successful. It will require some experience to ascertain this, before a trial, and great skill and care in making the trial, but as the alternative is turning or the crotchet, it is surely worth while to make a cautious attempt with the forceps, from which no harm need result in case of failure.

In all these cases it will be necessary to use the long forceps; in the following the shorter are sufficient, but, of course, either may be employed.

4. When the head is in the cavity of the pelvis, and is there detained by want of space, if *the compression required for its extraction be not greater than the head of the child will bear with safety, and the violence to the soft parts of the mother in extraction be not such as necessarily to injure her,* the forceps may be safely used, either laterally, obliquely, or antero-posteriorly. Siebold is said to have been able to reduce the transverse diameter of the head of the child six lines with Levret's forceps; Osiander, nearly an inch; Baudelocque, four and a half lines; Thouret and Velpeau, five or six lines; and Flamant, five and a half lines. Of course the amount will be in inverse proportion to the degree of ossification.

5. In face presentations, the longest diameters of the child's head are brought to bear upon the pelvis, adding greatly to the difficulty of its transit through the lower outlet, even when the pelvis is large, and still more if it be under the average dimensions. In such cases, aid may often be given by the forceps, so as to save the child's life, and to mitigate the suffering and its consequences to the mother. It is not, however, to be assumed, that because the child descends faceling, assistance will be necessary; the majority are delivered by the natural efforts.

6. The same observations apply to certain, though more rare cases, when the forehead is turned towards the symphysis pubis.

7. But the utility of the forceps is seen more clearly in those cases in which the pains, at first very strong, have gradually declined so as to be nearly or altogether powerless, but not from the resistance occasioned by a narrow pelvis. There may be sufficient space, the os uteri and external parts well dilated, and yet the labor does not advance. In such a case, the second stage cannot be very much prolonged without certain symptoms arising, indicative of danger to the mother; and here we are able to relieve her without difficulty or risk, and to save the child (if it be alive) by the timely use of the forceps. In such cases (and every one must have met with them) I think I may say, that the operation adds absolutely nothing to the danger either to mother or child.

8. When the hand or arm descends with the head, the additional bulk will require more expulsive force, and occasionally, aid must be afforded by the forceps.

9. In some cases of convulsions, hemorrhage, and rupture of the uterus, where the head is within reach, the forceps are found extremely useful in expediting the delivery.

10. In certain cases of breech presentation, it is very difficult to extract the head after the body is expelled, either from mal-position, or from the incompressibility of the base of the skull; in these cases the difficulty may be removed or overcome by the forceps.

11. The forceps may be used after vaginal hysterotomy or symphyseotomy.

12. In prolapse of the funis, when it is an object to hasten the labor, in order to save the child. The pulsation of the cord will show whether the operation affords a chance.

561. These are, I believe, all the cases in which the forceps have been used or recommended by high authority; to complete the subject, I may mention certain cases in which they ought not to be employed.

1. In distortion of the pelvis, or when its calibre is diminished from any cause, such as tumors, exostosis, etc., if the narrowing of the pelvis be too great to admit of the passage of the child's head, when moderately compressed; these cases can only be terminated by the perforator, or hysterotomy.

2. When the os uteri is rigid and undilatable, or when the passages are much inflamed and swollen, the forceps ought not to be used.

3. In some cases, where the patient has been mismanaged, and allowed

to remain too long, the system is in such a state that we are obliged to have recourse to the most expeditious mode of delivery. In these cases, if there be a strong doubt of success with the forceps, it may be wiser to have recourse to the perforator, more especially as, in such cases, the child is generally dead. But such cases could scarcely happen under the care of a well-educated practitioner, nor are they at all frequent.

4. If the child be dead, we are advised to prefer craniotomy. If we are quite certain that the child is dead, the principal objection against craniotomy is removed, and the operation is easier and safer than the forceps; but this is not always easy to determine. The stethoscope is a most valuable source of information; but it must be remembered, that while its positive evidence is unquestionable, the negative evidence (*i. e.*, no sign being audible) is not equally conclusive. Dr. Collins, whose experience has been very extensive, remarks: "I know of no case where the advantage derived from the use of the stethoscope is more fully demonstrated than in the information it enables us to arrive at, with regard to the life or death of the fœtus, in the progress of tedious and difficult labors."

562. We next come to consider the *period for operating.* "It is one of the nicest points in practice, correctly to decide, whether any given case of protracted labor may be trusted with safety to the further exertions of the natural agents, or whether the means of art ought to be promptly brought to their assistance. In determining this important question, the whole of the symptoms are to be collectively and severally considered, and their different tendencies accurately examined, that we may equally escape the imputation of haste and indiscretion on the one hand, and of delay and indecision on the other; yet, let us ever bear in mind, that more injury may possibly accrue from too long delay, than arise from premature assistance."[1]

The decision of this point must, in a great measure, be left to the judgment and experience of the practitioner. No very definite rule can be laid down: we find both individuals and nations differing upon the subject; the Germans operate more frequently, and at an earlier period than the British, but on the other hand, they have fewer crotchet cases. And I think it must be admitted that until lately we have been too much afraid of the forceps, and have allowed cases to become the subjects of craniotomy, which, at an earlier period, might have been safely delivered by the forceps.

In forming our decision, there are several points for consideration:

1. The local circumstances of the case, such as the position of the head, space in the pelvis, complications, etc.; these constitute the principal grounds of necessity for the operation, and have been enumerated.

2. The general condition of the patient, and the presence or absence of the symptoms of a prolonged second stage; if present, their amount, urgency, rapidity of development, etc.

Our great object in the use of the forceps is to anticipate these formidable symptoms, and to rescue the patient from the danger. I think, then, that as regards the mother we may conclude:

1. That as these formidable symptoms are not consequent upon a prolonged first stage, therefore, before the completion of the first stage of a labor, that is, before the os uteri is perfectly dilated, and the membranes broken, the use of the forceps cannot properly come into contemplation. But I would remark, that when the obstacle is at the upper outlet, the second stage virtually commences when the os uteri is fully dilatable, as the head *cannot* pass through it, and the usual symptoms may arise if the labor be sufficiently prolonged.

2. That when the second stage has lasted so long as to prove the inade-

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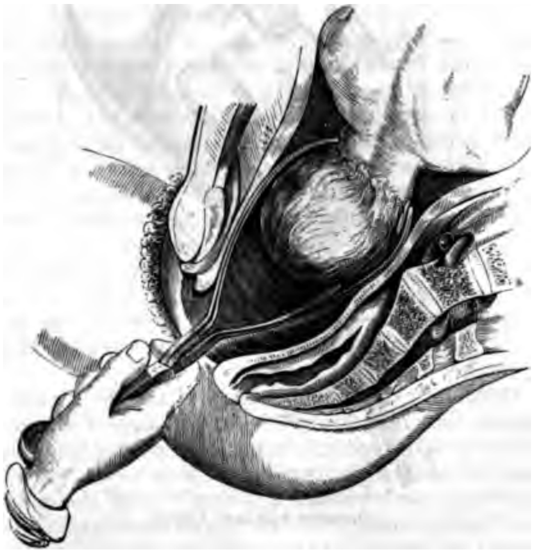
[1] Ramsbotham's Practical Observations on Midwifery, vol. i. p. 256.

quacy of the natural powers, or at all events, so soon as the symptoms of a prolonged second stage make their appearance (quick pulse, dry tongue, fever, etc.), then we ought promptly to interfere. "A practical rule has been formed, that the head of the child shall have rested for six hours as low as the perineum, that is, in a situation which would allow of their application before the forceps are applied, though the pains should have altogether ceased during that time." The symptoms, however, are a surer guide than the duration of the labor merely; some patients will show more signs of suffering after six hours, than others after twelve or sixteen. Dr. Collins observes: "Let it be carefully recollected, at the same time, that so long as the head advances ever so slowly, the patient's pulse continues good, the abdomen free from pain on pressure, and no obstruction to the removal of the urine, interference should not be attempted, unless the *child be dead.*" With great respect, I think this rule defective: to a certain extent it is true, but it is not the whole truth, for there are many cases which continue exactly in this state until powerless labor sets in, and in which, from the character of the labor, it may be certainly foreseen that these symptoms will arise, and that the woman will not previously deliver herself. In all such cases I would maintain that the forceps should be used so soon as we feel justified in coming to that conclusion.

3. The life of the child is a very important element for our consideration. After the second stage has lasted a certain time, there is considerable risk to the child, and it may even die before the symptoms on the part of the mother become very formidable, though this is not generally the case. This condition may sometimes be detected by the stethoscope, the action of the heart becoming feeble and irregular. In such a case, if no counter-indication existed, it would be our bounden duty to interfere for the purpose of saving the child's life, provided the operation were practicable.

Fig. 120.



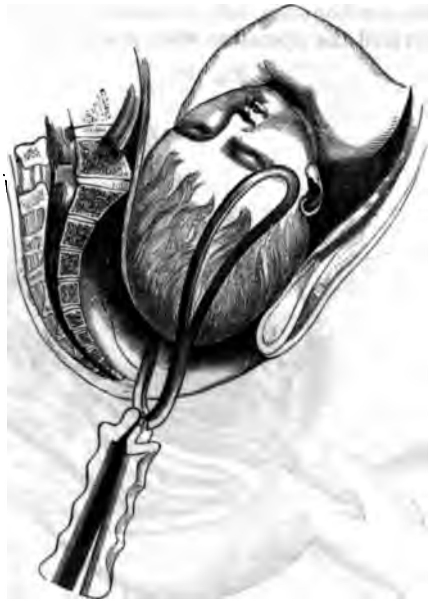
Operation with Long Forceps.

563. **Method of operating.**—When once we have determined upon the propriety of operating, the operation itself is not very difficult; it requires

a thorough *tactile* knowledge of the pelvis, some manual dexterity, and steadiness. I shall first describe the application of the long forceps at the brim, and then (the long or short forceps) in the cavity of the pelvis.

I. *The long forceps.* — These may be applied either in the transverse, oblique, or antero-posterior diameter of the pelvis. If our object be compression or a change of the position, the antero-posterior diameter (fig. 120) will be the best; but if necessary they may be applied in the transverse, or still better in the oblique, diameter (fig. 121) of the brim. In this position, as there is more space, their application is more easy; but it must be remembered, that in proportion to the grasp we take of the head in its longitudinal diameter, we diminish that diameter, but increase the transverse, and so may add to the difficulty of the descent of the head. Therefore, only sufficient force should be used to enable us to extract. "When about to apply the long forceps, it is to be remembered that the difficulty exists at the brim of the pelvis, that the antero-posterior diameter, or that from the symphysis pubis to the promontory of the sacrum, is diminished; in the application of the instruments, therefore, care should be taken that they be placed over the head, in such a situation that they may occupy the most roomy part of the pelvis, which will be its lateral diameter. In a natural presentation and situation, one blade of the instrument will consequently be placed over the forehead, the other over the occiput."[1] Dr. Simpson considers the oblique diameter as the best, and indeed the only proper situation in which to apply the long forceps, at the brim,[2] as in the accompanying plate. (Fig. 121.)

Fig. 121.



Operation with Long Forceps.

The patient is to be placed on her left side (or on her back), close to the edge of the bed; the forceps, warmed and oiled, are to be within reach, and the operator should introduce two or three fingers of his left hand, or his whole hand, during an interval of pain, along the head of the child within the os uteri, for the purpose of protecting it, and guiding the blade of the forceps. The upper or anterior blade is then to be passed along the inside of the fingers or hand, in the axis of the upper outlet, until it glides over the part of the head to which we wish to apply it. It is then to be retained *in situ* by an assistant, and the hand or fingers withdrawn; the right hand (or two fingers) is next to be introduced on the opposite side, and the second blade passed carefully up, and applied to the head. If the blades have been properly placed, they will lock; but if not, one must be withdrawn, and reintroduced. When locked, the handles may be tied together or grasped firmly, and the extracting force applied, of which I shall speak presently.

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[1] Waller's edition of Denman, p. 279, note.

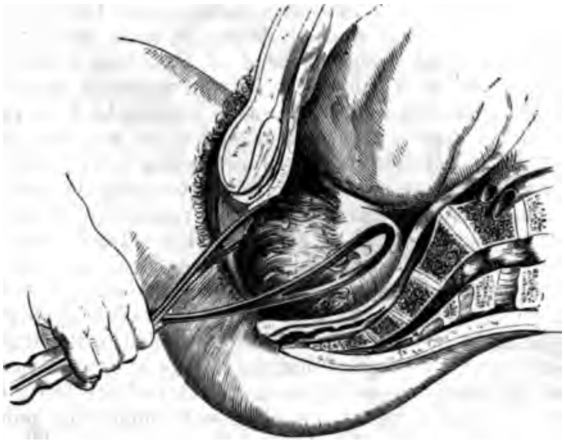
[2] Proceedings of Edinburgh Obstetric Society, Seventh Session, p. 17.

The most important points to remember in the application of the long forceps are:—

1. To guard the os uteri with one hand.
2. To introduce the upper or anterior blade first.
3. To pass the blades in the axis of the upper outlet.
4. To regulate the force of the grasp, according to the circumstances of the case.

564. II. *The short forceps.*—These may be passed in accordance with the transverse, oblique, or antero-posterior diameters of the pelvis. In many cases it is impossible to introduce them laterally, but it is always possible, and in my opinion by far the best way, to introduce the first blade under the arch of the pubis, and then give it an oblique position; introducing the second or posterior blade opposite to it, which is not difficult. Thus applied we shall be quite as able to extract, but we must bear in mind the observation made when speaking of the long forceps, that pressure in the long diameter of the child's head increases its lateral or transverse diameter, and so far augments the difficulty of its extraction.

Fig. 122.



Operation with Short Forceps.

The bladder and rectum should be evacuated before the attempt is made, and the forceps warmed and oiled, as already mentioned. The patient is then to be placed near the edge of the bed, and after a careful examination, our decision formed as to the part to which the instrument is to be applied. One or two fingers are then to be introduced into the vagina, during an interval of pain, to guide the forceps and protect the soft parts.

We must always be careful that "the point of the instrument be constantly kept in contact with the head; to effect which, it will be necessary to remember that the child's head is in every part convex, and, therefore, as the instrument advances, the handle must be raised, or otherwise in its progress it may pass on, instead of going under, the os uteri, if any part should remain in contact with the child's head."[1]

The forceps must be introduced at first in the axis of the lower outlet, but this direction must be almost immediately changed into that of the upper outlet, or there will be danger of wounding the posterior wall of the vagina. The upper or anterior blade should be introduced first, and then the lower or posterior one. When both are applied, they ought to be opposite, and if so, will easily lock; but if, on endeavoring to lock the forceps, it should be found that they do not readily come together, they have not been properly introduced: no force or violence should be used to bring them together, but the second blade should be withdrawn, and introduced afresh. Great care must also be taken that the soft parts, or hair, are not included in the lock, as this will give great pain. The lower part of the handles may be tied together by a ligature, so as to determine the force of the grasp, which has this advantage, that it fixes the degree of compression, and leaves the operator at liberty to occupy himself with the extraction only. If, however, the head fit tightly, and more compression than merely that which is sufficient for extraction be necessary, it will be useless; the operator must then regulate the compression with his hand, and extract at the same time. "When the forceps are first locked, they are placed far backward, with the lock close to, or just within, the internal surface of the perineum; and they can have no support backwards except the very little which is afforded by the soft parts. The first action with them should therefore be made by bringing the handles, grasped firmly in one or both hands, to prevent the instrument from playing upon the head of the child, slowly towards the pubes, till they come to a full rest. Having waited a short interval with them in this situation, the handles must be carried back in the same slow but steady manner to the perineum, exerting, as they are carried in the different directions, a certain degree of extracting force; and after waiting another interval, they are again to be raised towards the pubes, according to the situation of the handles."[2] We must remember "that the force employed in extracting the head be always and steadily from blade to blade, but with intervals resembling the labor pains, and constantly in the direction of the axis of the pelvis, till the occiput begins to emerge from under the arch of the pubis, when the handles are to be raised over the symphysis pubis with the right hand, while the left is applied to strengthen and preserve the perineum."[3] I believe that the facility of extraction depends very much in drawing the head well down in the axis of the lower outlet, in the first instance, and then carrying it well forward under the pubic arch, and this, whether the forceps be applied laterally or obliquely. The whole power or force which the instrument enables us to use ought not to be exerted in the first instance, but such a degree as any individual case may require, which can only be known by first trying a moderate degree of force, increasing it slowly and deliberately, according to the exigence of each case.

When we thus employ the power we possess gradually, steadily, at intervals, and in the direction of the axes of the pelvis, we must not forget the danger (in some cases at least) from pressure or contusion. Our guide in this matter is the pulse, which rapidly rises if injury be inflicted. "If the pulse be 120 or 130 before you commence operations, it is clear that you cannot, from counting the beats, take an intimation whether the soft parts have or have not sustained injury; but if, before the forceps be applied, the pulse is under 100 in the minute, then should contusion be produced by your efforts with the instrument, the rise of the pulse will indicate it. After every effort with the forceps, therefore, count, waiting two or three minutes, so as to allow the beats to subside after muscular exertion, and count completely round the circle. If you find it below 100, no serious injury has been inflicted; if the frequency is increasing, although it does not necessarily follow that serious injury has been inflicted, yet the existence of contusion becomes probable, and further efforts must not be made without much consideration."[1]

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[1] Osborn, Essays on Parturition, p. 99.

[2] Denman's Introduction, p. 281.

[3] Osborn, Essays on Parturition, p. 100.

When our efforts have been so far successful, that the occiput emerges from the lower outlet, if there be pains, it is better to remove one blade (the posterior one, when they are applied antero-posteriorly) of the forceps, to lessen the risk of laceration, and the perineum should be carefully supported by an assistant, whilst the operator uses the other blade as a tractor, if necessary. If the head be high up in the pelvis, we must take care that the usual half-turn be made as it descends, so as to bring the face into the hollow of the sacrum.

In breech cases, when the head is detained, the operation is not very different; the blades are to be passed up antero-posteriorly, or laterally, and locked across the chin, or back of the head, and the extracting force applied, gently, firmly, and at intervals, not forgetting the natural turns, so as to bring the face into the hollow of the sacrum, if possible.

565. *Difficulties.* — "The difficulty of applying the forceps," says Dr. Denman, "is most frequently occasioned by attempting to apply them too soon: or passing them in a wrong direction; or by entangling the soft parts of the mother between the instrument and the head of the child, against all which accidents we are to be on our guard."

1. The first difficulty we meet with is in the introduction of the blades. There may not be space enough, and if we find this to be the case, after a fair and careful trial, we are not to persist at the risk of injury to the mother, but craniotomy must be performed.

When the head is pressed down against the tuberosities of the ischia, there will often be difficulty in passing the blades between them; and if the head cannot be raised up during an interval of pain, the forceps had better be applied antero-posteriorly, or both blades being introduced posteriorly, we may gradually slip them to either side. I do not speak of the difficulty of applying the forceps when the os uteri is rigid, because it should never be attempted.

2. As I have already mentioned, there may be some difficulty in locking the blades, and then one of them must be withdrawn and reintroduced. It is quite possible to deliver the child without locking the blades, but there is more chance of injury, and the instrument is more apt to slip.

3. The extraction may be difficult, or even impossible. The great value of experience in such cases is, that it teaches us how far we may carry our efforts without injury. Perhaps a little more compression, or a little more force, may crown our efforts with success, provided that it did not exceed safe limits. But great care and caution will be necessary, and if we find our efforts fruitless after a fair trial, we shall then be justified in having recourse to the perforator, nor will the patient be the worse for the failure with the forceps, if the attempt have been judiciously made.

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[1] Blundell's Principles and Practice of Obstetricy, p. 505.

566. The principal *dangers to the mother* are:

1. In the introduction of the blades, if it be not effected in the axis of the upper outlet, the vaginal parietes may be lacerated, and if the cervix uteri be not guarded by the hand, the blade may be pushed through it, or it may be included between the end of the blade and the child's head. Cases of mal-practice illustrative of these dangers might easily be quoted, but it is sufficient for my purpose to allude to them as a caution.

2. The soft parts in the pelvis may be bruised or lacerated in the extraction.

3. The perineum may be lacerated.

The *dangers to the child* arise:

1. From want of care in introducing the blades, by which the scalp may be bruised or torn, or an ear cut off.

2. From excessive compression, by which the skull may be indented, the bones fractured, or death from pressure induced.

Dr. Blundell has given a distressing picture of the accidents which may result from an incautious or maladroit use of the forceps.

"The grand error you are apt to commit in using the long forceps, is force. In violent hands, the long forceps is a tremendous instrument; force kills the child, force bruises the softer parts, force occasions mortification, force breaks open the neck of the bladder, force crushes the nerves; beware of force, therefore, *arte non vi.* Other errors, too, there are, against which I beseech you to guard. You may use the forceps without heed; you may try to use it when the parts are rigid, and the os uteri not fully expanded; you may attempt to apply it without knowing the position of the head; you may oscillate the instrument too extensively from side to side; you may draw without intermission, instead of imitating the pains; you may close the handles too forcibly by the hand or ligature; you may hurry the head through the outlet; you may neglect to throw the face towards the sacrum; you may forget the perineum; you may fail to conduct the head, when it emerges, towards the abdomen and mons, by drawing it too much upon the perineum."

567. *After-treatment.*—The first symptom which will require our attention, is the shock caused by the operation. If it be great, a combination of opium with ammonia will be found the best remedy, with wine and water in moderate quantity. If it be not severe, perfect quiet will be sufficient, and the subsequent management is the same as after ordinary delivery, with increased caution, however, and daily attention to the state of the vagina. If there be any soreness or inflammation, warm water injections should be used twice a day.

568. It is right here to notice some instruments which have been proposed as substitutes for the forceps. 1. Dr. Conquest many years ago proposed one, consisting of a loop of thin whalebone, fastened into a wooden handle. The loop is easily introduced, and placed over the occiput or chin, and he supposes that sufficient extracting force may then be exerted. When placed over the chin, it may, perhaps; but on trial, I found that over the occiput it had no purchase, but slipped immediately.

2. Dr. Simpson has invented a "sucker-tractor," consisting of a cup of vulcanized India-rubber, which is to be applied over the child's head, or a portion of it, and to which is attached a syringe, for exhausting the air. He has succeeded several times, without injury to the child, but as yet he does not consider the instrument complete. No doubt enormous force may be exerted by it, and if it do not injure the child, it is certainly very safe for the mother.

3. Dr. Evans, of Chicago, U. S., has contrived an instrument consisting of a band, with network and strings, which is to surround the forehead, and

embrace the head firmly, so as to allow of tractile force being exerted. It is applied by two steel rods (something in the way that the ligature is carried around a polypus by Gooch's canula), which are afterwards joined together.[1]

It is an ingenious instrument, but whether likely to supersede the forceps in any case, I cannot tell.

[Although Dr. Churchill avows his preference for "the long or short forceps with the single curve," etc., he appears in reality not to be at all tenacious on the subject of its construction. "The hand," he remarks, "that is to use the instrument is of more importance than the instrument itself, of which it may be observed with truth, that 'that which is best administered is best.'" In this expression, we believe that he inculcates a serious error.

A prudent and well-qualified operator, it is true, may not do *harm* with a *bad* instrument, but, on the other hand, he may be unable to accomplish any good with it, in cases where, with a better constructed one, he would succeed without difficulty.

"I have repeatedly," says Dr. Huston, in a note to a former edition, "seen gentlemen of large experience in the art, completely foiled in attempting to grasp the head at the upper strait, with a forceps having only the single curve, although when an instrument differently constructed was placed in their hands they accomplished it very readily; and I have myself delivered, successfully for both mother and child, under the same circumstances, with a long double-curved forceps, after others had failed with one without the second curve, or of insufficient length."

If the use of the forceps is to be confined to cases in which the head has descended into the cavity of the pelvis, resting on the perineum or protruding at the os externum vaginæ, then, indeed, "the hand that is to use the instrument is of more importance than the instrument itself;" nor is it of much importance what *hand* it is, if guided by the common feelings of humanity, so simple and easy is the operation. But when it is important to hasten the delivery while the head remains above the upper strait, or is still engaged in it, as in convulsions, hemorrhage, some cases of prolapse of the funis, aneurism, inability of the female, from feebleness, to sustain longer the natural parturient efforts, or when it is required to overcome contraction of the brim to a degree not so great as to demand the perforator—in such cases the kind of instrument we employ is of the greatest importance. The blades should be adapted to the head of the child, the shape should correspond with the axes of the pelvis, and the handles should be long enough to allow the operator to obtain a secure hold outside and free of the vulva, or success is not to be expected at the hands of the most dexterous obstetrician. British practitioners, we are aware, seldom employ the forceps under the circumstances we have mentioned. In this we think they are wrong,—they differ, certainly, from the practitioners of this country and of Continental Europe.

According to the rule for the application of the forceps, which, according to Dr. Robert Lee,[2] is adopted by the majority of English practitioners, every case in which the unaided powers of the woman shall fail to make the head "descend so low into the pelvis that an ear can be felt," will call for the perforator! The fruits of this practice may be learned from the following table, furnished by the same author:

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[1] Ranking's Abstract, vol. ii. p. 275.

[2] [Clinical Midwifery, by Robert Lee, M. D., etc., p. 1.]

A Comparative View of the Frequency of Forceps and Craniotomy Cases in eleven Lying-in Hospitals.

Hospitals.	No. of Labors.	Forceps Cases.	Proportions.	Craniotomy Cases.	Proportions.
Dublin, Clarke . .	10,199	14	1 in 728	49	1 in 248
" Collins . .	16,654	27	1 in 617	118	1 in 141
Paris, Baudelocque .	17,888	31	1 in 561	6	1 in 2898
" Lachapelle . .	22,243	76	1 in 298	12	1 in 1854
" Boivin . . .	20,517	96	1 in 214	16	1 in 1282
Vienna, Boer . . .	9,589	35	1 in 274	13	1 in 787
Heidelberg, Naegelè .	1,711	55	1 in 31	1	1 in 1711
Berlin, Klugè . . .	1,111	68	1 in 16	6	1 in 185
Dresden, Carus . .	2,549	184	1 in 14	9	1 in 283
Berlin, Siebold . .	2,098	300	1 in 7	1	1 in 2098

From this table it will be seen that those who relied most on the forceps, had the fewest occasions to resort to craniotomy, and *vice versâ*. Of the extreme cases on each side, it will be observed that Dr. Collins, whilst he employed the forceps but once in 617 cases, resorted to craniotomy once in 141 cases; or nearly four and a half times as often as he did to the forceps. Dr. Siebold, of Berlin, had recourse to the forceps once in every 7 cases, and to craniotomy but once in 2093 cases! It is not difficult to imagine on which side was the greatest mortality. Whence arises this prodigious difference? Unquestionably from the different principles by which the practitioners of these countries are guided. As properly observed by Dr. Lee, "if we compare the reports of the principal Lying-in Hospitals of Great Britain, France, and Germany, and examine the doctrines inculcated by the best systematic writers of these countries, it is impossible to avoid being struck with the want of uniformity which prevails in all that relates to the operations of midwifery. Although the cases of difficult parturition must be nearly the same in every part of Europe, cases of instrumental delivery are far more numerous in some countries and institutions than in others, and the method of operating is widely different."

To the practitioners of this country, the reports of the English Lying-in Hospitals are of a most surprising character, especially when it is considered that these Institutions are under the supervision of men of the highest standing in the profession. The frequency with which many of the Germans employ the forceps is in strong contrast with British practice, and is perhaps scarcely more rational.

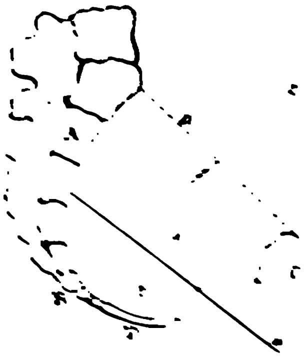
The frequent occasion which English practitioners find for a resort to craniotomy appears to proceed from the rules by which they are governed in regard to the use of the forceps, and which limit its application to a comparatively small number of cases. Whether these rules are deduced from a consideration of the mechanical properties of the instruments they employ, or whether the instruments are constructed in reference to the objects contemplated by the rules, they certainly concur in restricting the use of this means of relief within much narrower limits than either Continental or American practitioners deem necessary or proper.

The sufficiency of the English or almost any other forceps for the management of cases where the head of the child has passed through the upper strait, is admitted; but are they equally capable of useful application before matters have advanced thus far? The application of the various short forceps, when the head of the child has not passed through the upper strait, is certainly out of the question. The distance which it is necessary to pass the instrument within the pelvis, and the almost impossibility of obtaining by it a secure hold of the head, renders it valueless. The only exception, if it really be one, is the forceps of Dr. Davis. A very serious objection, however, to this instrument is one that is common to all of its class,—the blades are so short that, when introduced sufficiently far to embrace the head in the upper strait, the lock is brought within the vulva. This, beside the danger of injury to the soft parts of the mother, leaves to the operator a very insufficient hold of the handles for efficient action. The great width of the blades, too, is an objection, perceived by Dr. Davis himself; he has endeavored to obviate the difficulty by the occasional use of *one blade* formed very narrow.

These objections are made, however, with great deference, as well from the high character for skill of the inventor, as from the fact that it is the instrument preferred by the Professor of Midwifery in Jefferson College, Dr. Charles D. Meigs.

Dr. Churchill prefers "the long or short forceps, with the single curve." There is certainly no advantage in the second curve to the *short* forceps; it being only applicable in cases where the head has descended into the cavity of the pelvis; as there is in such cases but one strait to pass, an instrument which corresponds in form with the axis of that one strait, is all that is required. But it is widely different when the head is to be delivered from the upper strait. It must be borne in mind that the axes of the two straits run in very different directions—that of the upper strait being downward and *backward*, and of the lower, downward and *forward*. Now in order to embrace the head in the upper strait, the instrument must pass through the outlet in the axis of the lower strait, or nearly so: and, consequently, it must have a form corresponding, in a considerable degree, with the curved line running through the axes of both straits, otherwise there will be excessive pressure made upon the perineum by the instrument, and extreme difficulty in adjusting it properly on the head of the child.

Fig. 123.



Axes of Pelvis.

A glance at the accompanying cut will exhibit this better than any verbal description. A. The sacrum. B. The coccyx. C. The pubis. D. The perineum. Dotted line a, plane of the upper strait; dotted line b, plane of the lower strait; c, imaginary line passing from the umbilicus to the upper part of the coccyx, and through the centre of the upper strait, or its axis; d, a similar line extending from the middle of the sacrum through the os externum vaginæ, and marking the axis of the lower strait. The curved dotted line between these straight lines, shows the course the head of the child must take in passing through the pelvis, and which must necessarily be traversed by the forceps when applied at the superior strait.

If we are never to apply the forceps but when an *ear* can be felt, and "*the head is resting on the perineum*," there is indeed little occasion for a long instrument; but what is to become of patients laboring under organic affections of the heart, hemorrhage, convulsions, certain tumors of the pelvis, slight contractions of the brim, great debility, aneurism, hernia, arrest of the head from want of proper rotation, etc.? No practitioner should feel himself at liberty to stand by in such cases and see his patient sink into the grave without attempting delivery until the *head rests upon the perineum, or an ear can be felt;* nor should he dare to plunge the perforator into the fœtal head, without first endeavoring to save its life by the use of the forceps.

As to the *ear* as a guide, Dr. Rigby is perfectly right in saying that the position of the head should always "be determined by the direction of the fontanelles and sutures, not by feeling for the ear." "The ear can seldom be reached without a good deal of pain, even under the most favorable circumstances."[1]

The average of the results of British practice, as shown by their statistics, is certainly creditable: this is owing, no doubt, in a great measure, to the prudent avoidance of all unnecessary interference. But in shunning one error, we not unfrequently fall into the opposite extreme; and this would appear to be the case with our brethren of England and Ireland. If we confine our examination to *instrumental cases*, the comparison between their success and that of their neighbors is less flattering to them.

The extreme difficulty, not to say failures, which Dr. Huston, of Philadelphia, experienced in operating with the short forceps and those with a single curve, under the circumstances we have just considered, induced him many years ago to attempt to supply what seemed to him a great deficiency in the various forceps in common use. The forceps of Professor Siebold he found to possess many advantages over any others that he had met with, and he believed that with some little alterations it would accomplish the objects he had in view. The annexed engraving (fig. 124) represents the instrument and its several parts, as made by Wiegand and Snowden, pretty accurately.

Width of the blade at *a*, one inch and five-eighths; of the fenestra, one inch; separation of blades at the widest part when properly locked, two inches and a half (but this is increased nearly a quarter of an inch by the manner in which the blades are ground, being concave on their inner face, and convex externally: by this arrangement the liability of the instrument to slip off the head is lessened; length of the blades to lock at *b*, nine inches; length of the handles from joint at *b*, five inches. The lock, which is exactly like that of the German instrument, is formed by a thumb-screw, *c*, which is fastened into the male branch at *d*, and is received into a mortise in the female branch at *e*. This mortise is countersunk, so that when the screw or pivot is screwed down completely, the blades cannot be separated.

The instrument of Dr. Huston is the same length as that of Siebold's; the blades of the former are, however, longer than those of the latter, and the handles, from the pivot, correspondingly shorter. This brings the lock more completely free from the vulva when operating at or above the upper strait; at the same time, the shaft, or narrow part of the blade beyond the pivot, constitutes in fact part of the handle equally effective with the handle proper. The *fenestra* of the blade is nearly double the width of that of the German instrument, and the sweep of the second curve an inch and a quarter greater. The instrument is also four ounces lighter than the forceps of Siebold.

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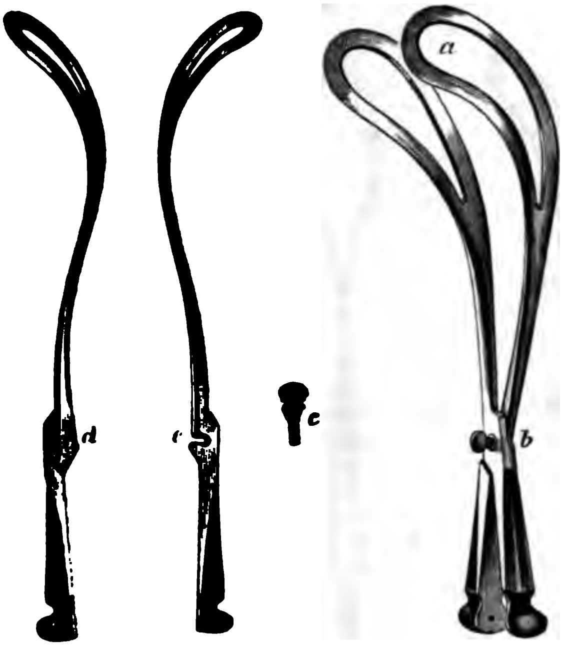
[1] [Rigby's System of Midwifery.]

Fig. 124.



Dr. Huston's Forceps.

According to Dr. Huston, the objects gained by these modifications are:

1. The blades being longer, the soft parts of the woman cannot be entangled with the lock.

2. The increased width of the fenestræ avoids the thickness of the instrument being added to that of the head, renders it less liable to slip off, and lessens its weight.

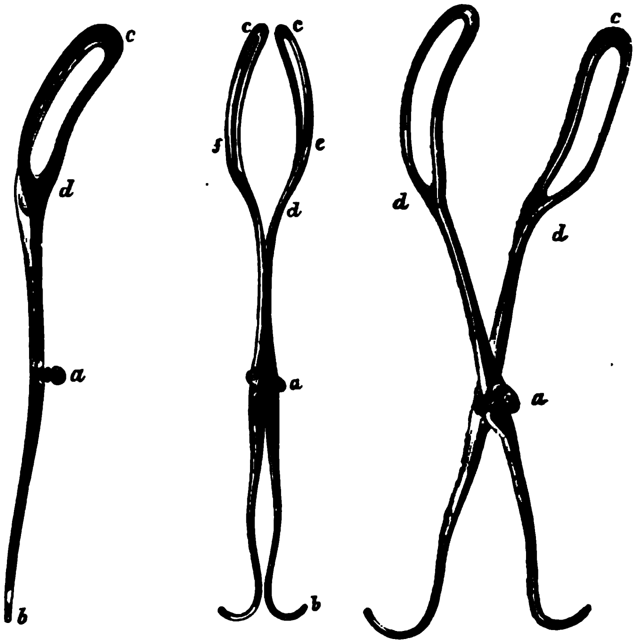
3. But the most important modification is in the increase of the second or pelvic curve, by which the blades correspond better with the form of the pelvis, so that when their extremities are in the axis of the upper strait, their shafts pass directly through the axis of the outlet. By this arrangement, the instrument is more readily applied when the head is high up, and all undue pressure on the perineum is avoided. This form of the instrument also enables the operator to apply it when the patient is on her back on a mattrass, without bringing her down so low as to have her limbs off the bed, which adds much to the comfort of the patient and the decency of the operation.

From this description of the instrument it will be understood that it is calculated, in every case, to be passed along the *sides* of the pelvis.

The following figures represents the forceps employed by Dr. Hodge, of the University of Pennsylvania. It is calculated, in a considerable degree, to accomplish the same objects as the one employed by Dr. Huston. The eclectic forceps, as Dr. Hodge calls his instrument, weighs one pound and one ounce; being nine ounces lighter than the French forceps, as usually manufactured by Mr. Rorer of this city, and eleven ounces lighter than a specimen of Dubois' forceps, made in Paris.

The whole length of the instrument in a direct line from *b* to *c* is 16 inches. From the joint *a* to extremity *b*, the length of the handles is 6·8. From *a* to *c c*, extremities of the blades is 9·5, in a direct line. From *a* to *d*, length of parallel shanks is 3·5. From *d* to *c*, the proper blades, in a direct line, is 6 inches. From *c c*, the extremities, to *e f*, the greatest breadth, 3·7 inches.

Fig. 125.



Dr. Hodge's Forceps.

The separation between the points *c c*, when the handles are in contact, is ·5 of an inch. From *e* to *f*, the greatest breadth when the handles touch, is 2·5; when the separation at *e f* is 3·5, the points *c c* are separated to 2 inches.

The breadth of the blade is 1·8, slightly tapering to 1·7 near *c c*, the extremities. The breadth of the fenestra is 1·1; the thickness of the blade is ·2 of an inch.

The perpendicular elevation of the points *c c*, when the instrument is on a horizontal surface, is 3·4 inches, which indicates the degree of curvature of the blades.

The elevation of the handles near the joint, above the same horizontal line, is 1·3 (including the thickness of the blades), which indicates the extent of the angular bend in the handles.

An important modification of the forceps was a few years since announced by the late Dr. Henry Bond, of Philadelphia.[1]

At an early period of his professional life it occurred to him that cases are sometimes met with, though not very frequently, where, owing to the position or the form of the fœtal head, and its relation to the pelvis, it is found impracticable to adapt the clams to the head so as to lock the branches, or to do so without violent injury to the mother or child.

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[1] [American Journ. of the Med. Sciences, Oct. 1850.]

Dr. Blundell very justly observes: "Unless the blades be elastic, absolute adaptation can (I conceive) never be obtained; for while the form of the instrument remains unchanged, that of the head itself varies." "The lock should be loose, so as to admit of a junction of the blades, although they may not be brought into exact apposition with each other; for, in applying them to the head, this adaptation cannot always be obtained." For this reason, he says that Smellie's lock (made loose) is decidedly the best.

According to Dr. Meigs, if we fail to adjust the branches accurately in apposition, we either cannot make them lock, or we lock them in such a way that the edge of the instrument contuses, or even cuts the part of the scalp or cheek on which it rests, leaving a scar, or actually breaking the tender bones of the cranium, while the other edge cuts the womb or vagina by its free projecting edge. In fact the forceps is designed for the sides of the head; and if, under the stress of circumstances, we are compelled to fix them in any other position (an incident not very unfrequent), we shall always feel reluctant to do so, and look forward with painful anxiety to the birth, in order to learn whether we have done the mischief we feared, but which we could not avoid.[1]

Dr. Bond remarks, that the difficulty and the danger in such cases evidently arise, to a great extent, from the want of an accommodating, rocking motion of the branches of the forceps upon each other, such as will allow the depressed ("cutting and contusing") edge to rise, and the elevated edge to sink and come in contact and apposition with the head; that is, that the blades may be adapted to the head by varying from their usual relation to each other.

In the instrument,[2] designated in figs. 126, 127, 128, Dr. Bond has attempted to supply the *desideratum* just referred to, that is, *to give the branches of the forceps an accommodating rocking motion upon each other, the extent of which can be regulated at will, and which shall in no respect lessen the power of the instrument.* The mechanism devised to obtain this motion is very simple, not liable to derangement, and it may be adopted in the construction of forceps of other forms than that here presented; provided that the pelvic curvature of the branches does not take such a wide sweep, as to throw the pivot far out of the direct line between the handle and the centre of the fenestræ.

The instrument of Dr. Bond does not differ, as a whole, from those now in use; nothing connected with it except the lock, has any claim to novelty. Its whole length is about fifteen inches, and its weight about fifteen ounces. The length of the handle is six inches, and that of the blade nine inches. It might be made somewhat shorter and lighter without impairing its power.

In fig. 126 the pivot is seen of full size, the *screw* is of about double the diameter and nearly double the length of those in other instruments. This *additional strength* is necessary, because the bearing point of the pivot is not immediately above the blade in which it is inserted (as in other instruments), especially when this bearing point is elevated so as to give the blades a free rocking motion. The *additional length* is required to give the screw a firm lodgment, when it is partly withdrawn from the blade. The *thumb-piece* is made to fit so close upon the female blade, without resting upon it, and is so thick and rounded, that there can be no risk of injury should it ever happen to be brought into contact with the patient. The screw, when well made, will turn so easily that the thumb-piece may be made much less prominent than it is here represented. When the forceps is used, the thumb-piece should be placed *parallel with the blades;* otherwise it may interfere with the rocking motion. Between the thumb-piece and the screw, the pivot is of the form of two *frusta* of cones of equal dimensions, united together at their smaller diameters, forming an obtuse angle or groove at their junction. The base of that cone joined to the screw projects a little, forming a shoulder, intended to limit the motion of the screw into the blade.

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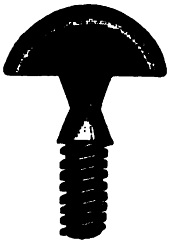
[1] [See "Obstetrics; the Science and the Art," chap. xv., for much information and excellent lessons on the use of the forceps. We commend attention to the author's emphatic inculcation of the idea, that "*the forceps is the child's instrument.*"]

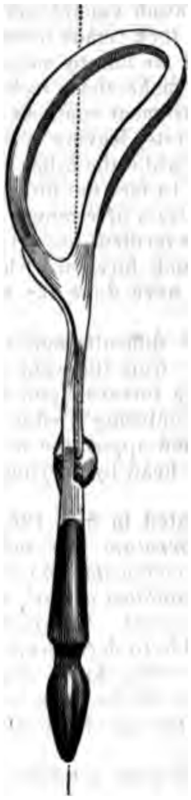
[2] [The instrument, from the manufactory of Messrs. John Rorer & Sons, of Philadelphia, is made of German steel, and spring-tempered.]

Fig. 126.



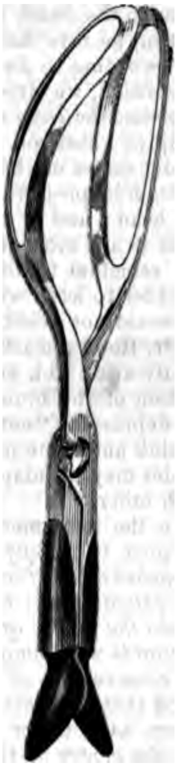
Dr. Bond's Forceps.

Fig. 127.



Dr. Bond's Forceps.

Fig. 128.



Dr. Bond's Forceps.

The notch in the female blade, made to receive the pivot, is so deep that the latter, in relation to the edges of the branch, is nearly in the middle; yet the width of this branch, opposite to it, is swelled out, so as to give it adequate firmness. The width and the form of the *sides* of the notch are accurately adapted to those of the pivot, and the *bottom* of the notch terminates in an edge, like the knife-edge of a balance, which is intended to rest in, and bear upon, the angle or groove in the pivot. On the under side of the male blade is seen a protuberance, finished so as to present no salient points. It is a shield for the extra length of the screw. When the pivot is screwed entirely down, the branches have no more lateral or rocking motion than those of any other forceps, and in this condition, they will very generally be used. But by turning the screw, so as to elevate the bearing point, more or less freedom is given to the rocking motion, according to its elevation; and this motion is effectually restricted within any desired limits. When, by means of this free motion, the operator has been enabled to grasp the head, he may sometimes change its position, so that the clams may be then adapted to the head, without the obliquity at first necessarily allowed to them by the elevation of the pivot; and then, if desirable, the pivot may be screwed down, and the blades will become as fixed as those of other forceps."

The *blades* of Dr. Bond's forceps (figs. 127 and 128) resemble nearly those of Dr. Davis. The shanks are considerably longer; the clams are not quite so long; the radius of their pelvic curvature a little less, especially that of the outer limbs, so that it will be less liable to be obstructed by the promontory of the sacrum, in passing the instrument above the superior strait. The fenestræ are wider in their middle and posterior part than those in most other forceps. When the pivot is elevated, so as to allow the blades their rocking motion, this width becomes especially requisite in order to secure a firm hold on the head, and to avoid the risk of their slipping sideways. The space between the blades is such, that, when applied to the head, the handles shall not be at a distance from each other, awkward and inconvenient to the operator. From the pivot, the upper line of the shank continues forward, without any elevation or depression, to the beginning of the pelvic curvature; and the form and the relation of the shank to the clam are intended to be such as to interfere the least with the perineum.

The pivot it will be seen (fig. 127) in these forceps, is in a direct line between the handles and the centre of the fenestræ. This is a *point of importance* in those cases where the rocking motion of the blade may be required, as it will cause each limb of the clams to press with nearly equal force, thus avoiding undue pressure upon any one part of the head, and the liability to slipping or displacement.

"I am aware," remarks Dr. Bond, "that the first impression of some persons, upon looking at the illustrations, will be, that the instrument is too straight, that the pelvic curvature ought to be continued into the shanks. If the whole operation, or the most difficult and important part of it, consisted in passing the blades above the superior strait, narrow blades, with a curve of a wider sweep, like those of Professor Siebold, slipping in probably with rather more facility, would be preferable. But as those here represented can be passed above the superior strait with facility, it seems to me that what I have already said upon the importance, in many cases, of having the pivot in nearly a direct line between the handles and the fenestra, furnishes a valid reason for adopting a model not differing essentially from that here presented."

The remarks of Dr. Churchill on the "*period of operating*" with the forceps, are highly judicious, and deserving of the especial attention of the junior practitioner. They are the more satisfactory because they inculcate sounder doctrines, according to our view of the subject, than are to be found in the writings of some of our late as well as older British authors, at least.

When the difficulty exists "at the brim of the pelvis, it will be better in all cases to apply the forceps in the transverse diameter." If there be want of space, it will be almost always in the antero-posterior diameter, and on that account there will be difficulty in passing the blades of the forceps between the head of the child and the pelvis; not only so, but it is nearly impossible to pass the posterior blade far enough, in consequence of the projection of the sacrum—if the instrument be straight, that is, without the second curve, the extremity will be arrested by the upper portion of the sacrum, or the shank of the blade will press very seriously against the perineum; in fact, it cannot pass thus without pushing this part back with great violence, as any one may see by looking at the vertical view of the pelvis represented in fig. 123, page 354.

In attempting to apply the instrument antero-posteriorly, there is always danger of injuring the bladder and rectum, which alone is a sufficient reason for rejecting this mode of operating, if any other will answer.

The only valid reason that can be discovered for applying the forceps antero-posteriorly is, that the pressure made by the instrument in that case is upon the part of the head corresponding with the least diameter of the brim. But if the blades be made without pretty wide fenestræ, their thickness will be added to that of the head, and will be quite equal to all that will be gained by the compression, if this be confined within the limits compatible with a proper regard for the safety of the child; and if it is required the head should be reduced more than this, the perforator should be employed. It must be admitted by all who have had experience in these matters, that the soft parts of the mother will bear as much compression as the brain of the child: if this be so, where the life of the latter is to be preserved, there is, certainly, no reason why the necessary compression or moulding of its head may not be left to the influence of the resisting parts. When this moulding operation is left to the maternal parts, the compression is made exactly at the points where it is needed, which can hardly be expected from the arbitrary influence of the instrument. We very much doubt the propriety of employing the forceps as a means of compressing the head of the fœtus, unless, perhaps, when the perforator is required. It should be resorted to only as a lever to alter the position of the head, or as a tractor to aid in its expulsion. That the forceps should never be used as a compressor, but solely as a tractor, is strongly insisted upon by Professor Meigs.]

CHAPTER XIII.

OBSTETRIC OPERATIONS.—5. CRANIOTOMY.

569. The next obstetric operation we have to consider belongs to the second class, that is, where one life is terminated to save the other; the mother's safety being secured by the destruction of her child, in cases where *both would be lost* if no interference were attempted. This is not an operation of election in any sense, but of stern and sad necessity; neither have we any choice which life we will save; the child cannot be saved by any means compatible with the mother's safety, and therefore it is destroyed. As to the arguments for and against the morality of the operation, I must refer my readers to the Appendix to this edition, where I have endeavored to investigate the question fairly and fully. I have seen too many difficult cases to agree with Dr. Tyler Smith that craniotomy can be abolished, but it has always been my object that it should be restricted within the narrowest limits. Professor Scanzoni, no mean authority, observes: "From all we have said, we conclude, that as yet, we know of no means which will render craniotomy useless. It is an operation which, undertaken on good grounds

and performed with address and good instruments, will save many lives, which otherwise would be sacrificed."

The instruments (or part of them) employed in this operation are of great antiquity; and although they were originally proposed for the extraction of dead children only, yet this scruple had not the effect of saving the life of the child, but merely postponed the interference until after its death. This conscientious quibble (refusing to destroy a child, but allowing it to die) was soon detected, and then the hook was used with living children, provided that delivery were otherwise impossible.

The class of cases to which it was applied, doubtless, included a vast number which were subsequently relieved by the forceps; but there were still left a great many in which it was indispensable.

Several of the ancients recommend this operation. Hippocrates advises the breaking up of the cranium, and extraction by the hook. Moschion advises embryulcia in those cases where the fœtus cannot be extracted by the hands, and if embryulcia be insufficient, the exsection of the limbs and body of the child. Albucasis, the Arabian physician, describes instruments for compressing and breaking up the child's head, and others for extracting it. Of certain cases of difficult labor, when the child is presumed to be dead, Celsus remarks, "Si caput proximum est, demitti debet uncus qui vel oculo vel auri vel ori interdum etiam fronti rectè injicitur."

In the Birth of Mankinde, written by Eucharius Röslin, translated into Latin about the year 1535, and into English by Thomas Raynalde, in 1634, I find the hook recommended to bring away dead children. "If so be," he says, "that it lie the head forward, then fasten a hook either upon one of the eyes of it, or the roof of the mouth, or under the chin, or on one of the shoulders—which of those parts shall seem most commodious and handsome to take it out by, and the hook fastened to draw it out very tenderly, for hurting of the woman." If the head be too large, it is to be opened with a sharp penknife, or broken in pieces. He also recommends excision of the extremities, if they present (the child being dead), or evisceration, to facilitate the delivery.

Ambrose Paré's work is dated 1579, and it was translated into English in 1634. In it are given plates of different hooks for drawing out the child, and a knife for the excision of the limbs.

From this time we find the operation recommended by every author, but the instruments underwent considerable modification, and the class of cases in which they were used considerably decreased. Of course this latter change was one of the consequences of the invention of the vectis and forceps.

570. The following are the principal modifications of the instruments for craniotomy:—

1. Albucasis describes a species of forceps with teeth, which he terms a "misdach, or almisdach," for the purpose of crushing the head, and enabling it to pass.
2. He also gives a plate of a single and double hook, for extracting the child, and of a knife for cutting off the head.
3. Ambrose Paré contrived two kinds of blunt hooks, and a double one with sharp points, for the extraction of the fœtus, and a knife for excision.
4. Mauriceau invented an instrument which he called a "tire tête," consisting of a circular plate of steel, fixed upon a rod. The circular plate was to be introduced into the head (previously opened by a scalpel), and being placed across the opening, traction was to be made. This instrument was never much used, owing to the difficulty of introduction, and its feeble power when introduced.
5. Sir F. Ould's "terebra occulta" consisted of a sharp-pointed rod inclosed in a canula or sheath, and retained by a spiral spring at the lower

end. When the handle was pressed upwards, and the resistance of the spring overcome, the point of the instrument protruded a certain distance, but was retracted when the pressure upon the handle was removed. Its application to the head was easy and safe; but it must have been nearly useless, from the small opening it made.

6. Dr. Simpson, of St. Andrew's, invented an instrument, which he called a "ring scalpel," for opening the skull. It consists of a loop of steel, through which the finger is to be passed, and from which protrudes a sharp-pointed blade about an inch long, by which the cranium was pierced.

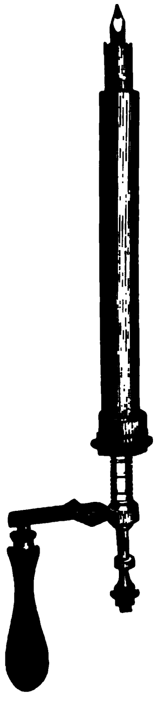
7. M. Mesnard described a crotchet which could be used either double or single, and which was the original of the one in present use. He also gives a plate of a "perce-crane," and a pair of "tenettes à conducteur," that is, craniotomy forceps.

8. Dr. Burton copied Mesnard's double crotchet and perce-crane" with some slight modification.

9. M. Levret gives a plate of a single crotchet, which was arranged to fit into a socket on the top of another blade for the purpose of protecting the mother, and rendering the purchase more secure.

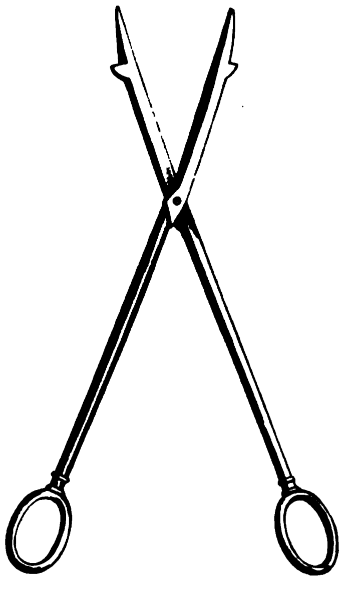
10. Dr. Smellie recommended Mesnard's crotchet (single or double); but, instead of the "perce-crane," he used a pair of strong scissors, with stops at the shoulders to prevent the blades entering too far. Denman abolished the cutting edge altogether, and added strength to the blades. A spoon was also used to evacuate the brain, but it is now very properly discarded.

Fig. 129.



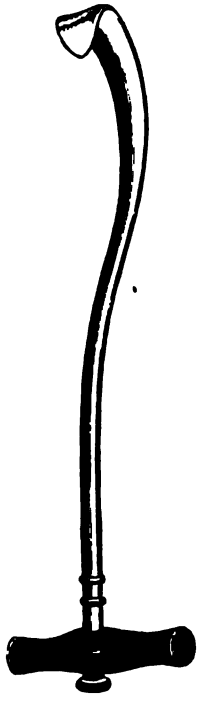
Hayn's Perforator.

Fig. 130.



Smellie's Perforator.

Fig. 131.



Crotchet.

11. Dr. Wallace Johnson published an account of his instruments for

opening the head and extracting the child. I do not know that they have ever been used by any other person.

12. Dr. Aitken proposed a flexible or living crotchet, which could be adapted to the convexity of the child's head.

13. M. Baudelocque recommended a very simple extractor, consisting of a small piece of wood, to the centre of which a ribbon was attached. An incision having been made with a bistoury or "perce-crane," the bar of wood was to be introduced and placed crosswise, and then extraction made by the ribbon.

14. M. Osiander has given a plate of an instrument for piercing the skull, and another for extracting. The latter is the same as Smellie's double crotchet.

15. Professors de Hayn, Vanhueval, Joerg,[1] and other German practitioners, use a species of trephine for perforating the head. It has the advantage of occasioning no splinters, and of perforating the face as easily as the skull. The accompanying plate is copied from M. Cazeaux's Atlas, and represents M. de Hayn's instrument. (Fig. 129.)

Fig. 132.

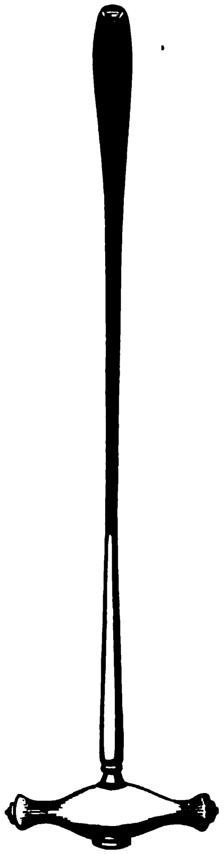
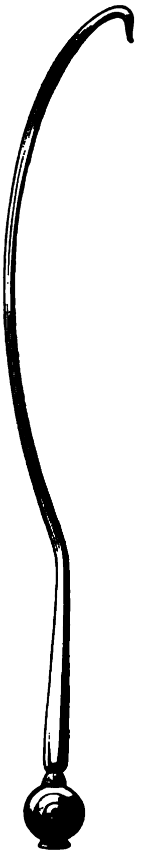
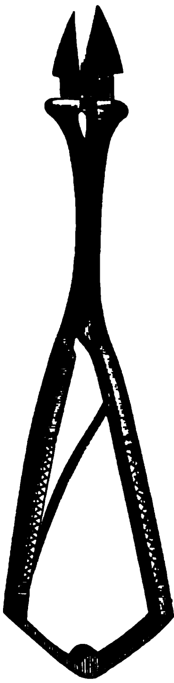


Fig. 133.



Churchill's Crotchet.

Fig. 134.



Holmes's Perforator.

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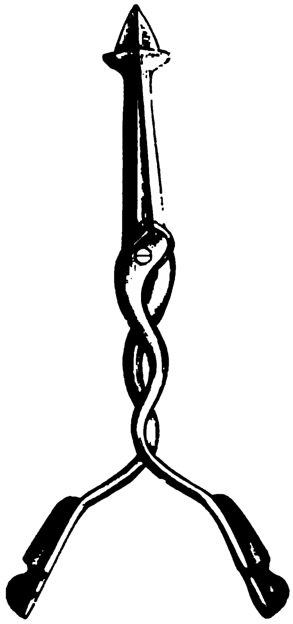
[1] Presse Méd. Belge, Dec. 31, 1848.

16. Dr. Davis has invented several species of crotchet, both single and double, as well as a pair of forceps for breaking up the skull. These are well exhibited in the fourth edition of his work.

These are a few of the principal instruments which have been employed in the operation of craniotomy. I have not given a detailed description, because most of them are discarded; the instruments in general use being a pair of scissors with shoulder-stops, as recommended by Smellie, but having a sharp edge on the outside (fig. 130), and a modification of Mesnard's simple crotchet (fig. 131). I have found it an advantage to shorten the points of the scissors above the stops, and also the hook of the crotchet; the latter of which should be slightly cleft (figs. 132, 133). Mr. Holmes and others have modified the latter, so that in closing the handles we open the blades (figs. 134, 135). Further, I have copied plates of a knife for cutting off the head or limbs if necessary (fig. 136), a blunt hook (fig. 137), and Dr. Davis's bone forceps for breaking up the skull (fig. 138).

Fig. 135.

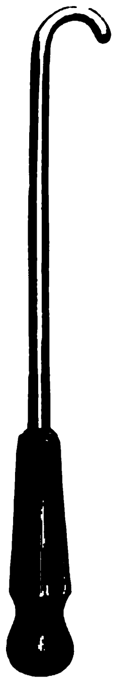


Holmes's Perforator.

Fig. 136.

Knife for Amputating Limbs.

Fig. 137.



Blunt Hook.

Dr. Oldham of London has recently proposed an instrument (fig. 139), which I think likely to be useful. It consists of a straight steel stem, fixed into a wooden handle, and bent at an acute angle at the other extremity, the whole being fourteen inches long. It can be inserted through the foramen magnum into the spinal canal, and thus obtain a purchase when the vault of the cranium has been broken up. Or it will serve to steady the head when it has been severed from the body, whilst the crotchet is applied.[1]

From the inconveniences sometimes experienced with the crotchet, and to avoid the risk of injuring the mother, craniotomy forceps have been employed by different individuals.

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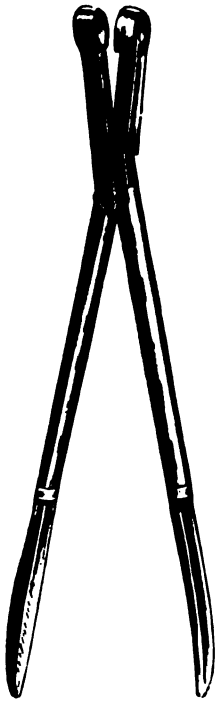
[1] Lancet, May 14th, 1858, p. 447.

Among the moderns, M. Mesnard has the credit of first inventing and using this instrument, and since his time it has undergone various modifications.

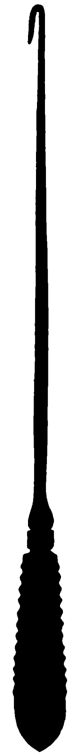
Dr. Haighton used a pair resembling the lithotomy forceps: and since his time Drs. Conquest and Davis, Mr. Holmes, and others, have invented and described varieties of the instrument (fig. 140). The object of each is the same, viz., to avoid the risk of tearing the soft parts of the mother; and the principle of seizing the skull between two blades, furnished with teeth, is also alike.

Fig. 138.



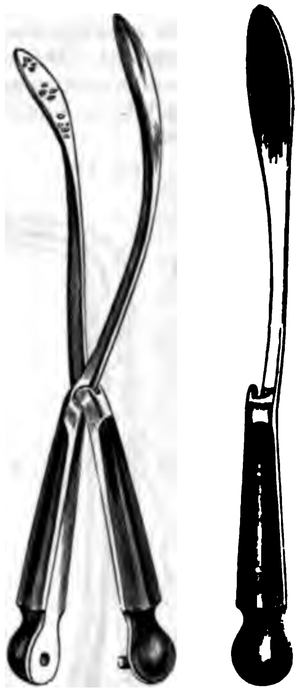
Dr. Davis's Bone Forceps.

Fig. 139.



Oldham's Instrument.

Fig. 140.



Craniotomy Forceps.

Dr. Zeigler of Edinburgh has invented an extracting forceps (fig. 144), which must possess great power from the grooved condition of its inner surfaces, and from its figure is adapted to cases of contracted pelvis, when the head has been previously perforated. Both blades are applied outside the cranium, as other forceps; but by substituting for one of these blades another with teeth (fig. 145), a craniotomy forceps of the ordinary kind is produced.[1]

I am free to confess that I do not like the craniotomy forceps, although I have tried them repeatedly. They are by no means so manageable as the crotchet; and the interposition of the hand of the operator will always protect the mother from injury by the latter.

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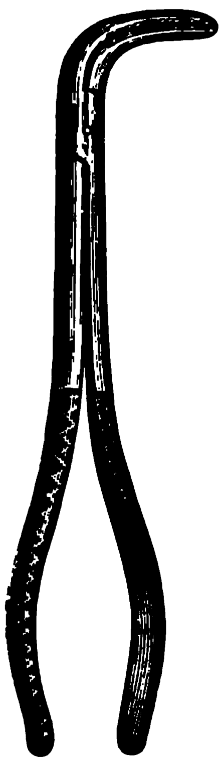
[1] Ed Monthly Journal, May, 1849, p. 770.

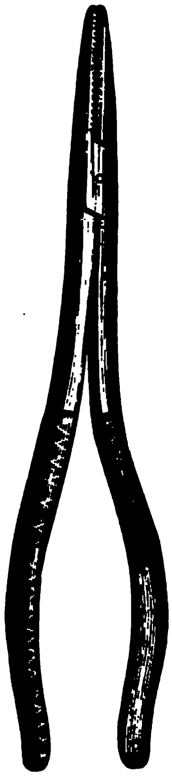
There is one case, however, in which these forceps may be more useful, and that is, when the bones of the head are extremely hard, so that it is almost impossible to fix the point of the crotchet.

17. M. Baudelocque, Jr., has invented an instrument, which he calls a "cephalotribe," for the purpose of crushing the head (fig. 146). It consists of a very strong pair of forceps, about two feet in length, the handles of which are connected by a screw which pierces them, and which is turned by a handle until the blades are so closed as to effect their object. Velpeau states that instruments somewhat similar have been formerly used by Assalina, Osiander, Delpech, Colombe, etc. M. Baudelocque is said to have used it three times successfully (and safely as regards the mother) in the year 1832, and once again in 1834. It is also said that M. Champion has tried it with success. M. Cazeaux speaks favorably of it in certain cases, and with certain modifications;[1] but its appearance is so formidable, that I doubt if it could be used in this country. I am not aware that the attempt has been made.

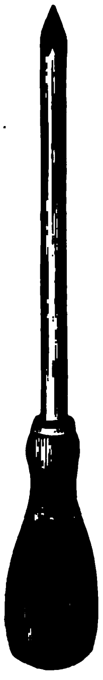
[Fig. 141.]



[Fig. 142.]



[Fig. 143.]



Dr. Meigs's Embryulcia Instruments.

[Professor Meigs uses the forceps and perforators represented in figs. 141, 142, 143. These forceps possess advantages over the ordinary instruments for extraction after perforation of the head, and are certainly safer in unpractised hands than the crotchet.

They are eleven inches in length; the gripe is serrated and the sides of the mandibles are rounded, in order that they may not pinch any tissues except those intended to be included in the bite, which, on account of the serræ, is very sure and strong.[1]]

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[1] Traité des Accouchemens, p. 585 Ed. Belge.

571. *The object of the operation* of craniotomy is to terminate the labor with safety to the mother, in cases where, from the disproportion between the size of the fœtal head and the pelvis, a living child can neither be expelled by the natural powers, nor extracted by the forceps. Such a case, if left to nature (as it is called) will terminate fatally for both mother and child ; consequently, although the child is destroyed to facilitate the delivery, and to save the mother, it cannot be said to be sacrificed, inasmuch as no efforts of ours could have insured its safety.

Fig. 144.

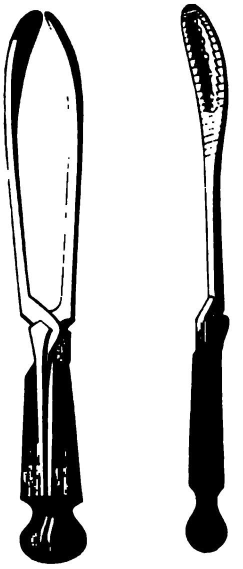
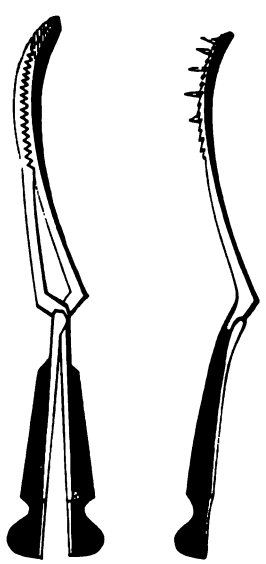


Fig. 145.



Craniotomy Forceps.

The case presupposes, on the one hand, *actual disproportion sufficient to prohibit the passage of the fœtal head, even when compressed;* and on the other, *that the distortion is not so great as to prevent the extraction of the child when mutilated.*

Dr. Osborn states that when "the bones approach much nearer to each other than three inches, it is utterly impossible for a living child at full maturity by any means to pass."[2] He fixes upon 2¾ inches as the diameter rendering craniotomy necessary. M. Alphonse Le Roi says that 3½, Dr. Aitken 3, Dr. Jos. Clarke 3½, Dr. Burns 3½, Dr. Ritgen 2, and Dr. Busch 2½ to 3 inches, is the smallest antero-posterior diameter through which a living child can pass.

As to the other limit of the operation, that is, the smallest diameter through which a child can be extracted after craniotomy, Dr. Osborn remarks :—"Whenever there is a space from pubis to sacrum, or from the fore to the hind part of the upper aperture of the pelvis, equal to an inch and a half, I am convinced it will be always practicable to extract a child by the crotchet, after the head has been some time opened, and the texture of the child's body is softened by putrefaction (as recommended above), and the whole of the parietal and frontal bones are picked away." Baudelocque says that the crotchet is inadmissible when the diameter is only 1⅞ of an inch; Dr. Dewees when it is less than 2; Dr. Hull and Dr. Burns believe that it may succeed when the diameter is 1¾; MM. Gardien and Hamilton when it is 1½; and Dr. Davis when it is 1 inch. We must not omit, however, another condition, viz., the safety of the mother. It may be quite possible to extract the child as far as mere mechanical extraction is concerned through an aperture extremely small, but what is the result to the mother? In the case related by Dr. Shekelton where the antero-posterior space was little more than an inch, the child was lessened and extracted, and the mother died "in ten minutes after the operation."[1] In another case under the present Master, Dr. M'Clintock, where the space was greater, the woman died within twenty-four hours. Now I quite agree with Professor Murphy,[2] that, where the space is so much reduced, that the mother incurs such peril, in addition to the loss of the child, it would be far better to have recourse to the Cæsarian section. I would not venture to have recourse to craniotomy unless the antero-posterior diameter was fully two inches. M. Cazeaux agrees with this opinion, but decidedly prefers it to the Cæsarian section when the diameter is above this.

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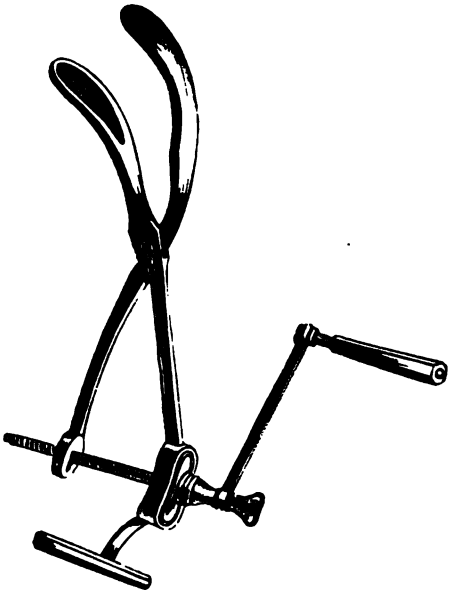
[1] [See Obstetrics — The Science and the Art, 2d edition.]

[2] Essays on Midwifery, p. 194.

Fig. 146.



The Cephalotribe.

572. The *nature of the operation* is simple, but the aid afforded may vary in degree.

1. In the case of dead children, the older practitioners used the crotchet alone as an extracting force, without opening the head.

2. In some cases where the sutures are very loose, the evacuation of the brain will be sufficient, as the bones of the cranium collapse so much under the influence of the pressure downwards, that the child may be expelled by

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[1] Dublin Journal of Med. Science, vol. x. p. 287.

[2] Ibid., Feb. 1859.

the natural powers. But in this case, it is assumed that the pains are sufficiently strong and frequent.

3. When (as is frequently the case) the pains are inefficient, or when the state of the patient demands prompt relief, then we must not only evacuate the brain, but add extracting force, by means of the crochet or craniotomy forceps.

4. In some cases the distortion of the pelvis is too considerable to admit the passage of the head, even when emptied of its contents; or the obstruction may result from the ossification of the bones of the skull; in either case, an extension of the operation is necessary to complete the delivery. This may be effected by breaking up the cranium with a small pair of forceps, resembling Dr. Davis's; or according to M. Baudelocque, jun., by the use of the cephalotribe. It would require unusual hardihood to venture upon the latter instrument in private practice in this country.

5. In these cases of distortion, after the head has been extracted piecemeal, we may find it impossible to bring away the body of the infant. We must then use the perforator, for the purpose of evacuating the contents of the chest and abdomen, and afterwards apply the crochet to extract the child.

One or more of these modifications of the operation will be successful in all cases which come within the limits already described.

573. STATISTICS.—The positive *advantage* we obtain from embryotomy is the safety of a large proportion of the mothers, who, in addition to the children, must have perished had no aid been afforded. The children, of course, are all lost.

What the proportion of success is, I shall now endeavor to show; but previous to this I shall adduce whatever evidence we possess to ascertain the comparative frequency of the operation.

FREQUENCY OF THE OPERATION.

a. *Among British Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1781	Dr. Bland . . .	1,897	8	Merriman's Synop. p. 333.
1787 to 1793	Dr. Jos. Clarke . .	10,387	49	Trans. of Assoc., vol. 1.
	Dr. Merriman . .	2,946	9	Synopsis.
1818	Dr. Granville . .	640	8	Report, p. 25.
1828, 1829	Dr. S. Cusack . .	701	5	Dub. Hosp. Reports.
1832, 1833	Dr. Maunsell . . .	839	5	Ed. and Dub. Jour.
1829	Mr. Gregory . . .	691	2	Dublin Hosp. Rep., vol. 5.
1826 to 1833	Dr. Collins . . .	16,414	79	Practical Treatise.
1834	Dr. Thos. Beatty . .	1,182	3	Dublin Jour., vols. 8, 12.
	Mr. Lever . . .	4,666	25	Guy's Hospital Reports.
	Dr. Reid . . .	5,691	22	Ranking. vol. 4.
1835,37,38,39	Dr. Churchill . . .	1,640	11	Reports to June, 1840.
1838	Mr. Warrington . .	88	1	American Journal.
1829	Mr. Mantell . . .	2,510	8	Ibid.
1848	Drs. M'Clintock and Hardy . .	6,634	52	Pract. Obs., p. 95.
1820 to 1827	Dr. Ramsbotham . .	68,435	85	Obst. Med. & Surg. p. 20.
1842 to 1844	Dr. Murphy . . .	467	2	Rept. of Univ. Col. Hosp.
	Dr. Storer . . .	451	2	Amer. Jour., Oct. 1851.
	Dr. Adams . . .	628	4	Ranking, vol. 4.
	Dr. Toogood . . .	1,185	6	Prov. Jour., vol. 8, p. 103.
	Dr. Copeland . . .	1,290	2	Crosse's Med., p. 12.
	Dr. Pagan . . .	8,684	15	Glasgow Jour. July, 1852.
1847 to 1854	Drs. Sinclair and Johnson . .	18,748	130	Pract. Mid., p. 224.
	Dr. Hall Davis . .	7,302	9	On Difft. Parturition, p. 271.

b. *Among French Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1797 to 1809	Mad. Boivin . . .	20,517	16	Mémorial, p. 387.
1803 to 1811	Mad. Lachapelle . .	15,654	14	Pract. d'Accouch., p. 500.
1834 to 1848	Dr. de Belli . . .	2,739	39	Ranking, vol. 4.

c. *Among German Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1801 to 1807	M. Richter, Moscow .	2,571	3	Velpeau.
1811 to 1827	Moschner and Kursak, Prague . .	13,329	4	Siebold's Jour., vol. 9.
1812	Dr. Siebold, Wurtzburg .	170	1	Ibid., vol. 1.
1818 to 1829	" Berlin .	97	1	Ibid., vol. 10.
1832	" Marburg .	155	1	Ibid., vol. 13.
1814 to 1827	Dr. Carus, Dresden . .	2,908	9	Ibid., vol. 9.
1819	Dr. Ritgen, Giesen . .	103	1	Ibid., vol. 6.
1825 to 1827	Dr. Kilian, Copenhagen .	2,350	4	Velpeau.
1794 to 1804	Dr. Henne, Prague . .	500	1	Siebold's Journal, vol. 2.
	Dr. Naegelè, Heidelberg.	1,411	5	Velpeau.
	M. Boer, Vienna . .	39,390	84	Die Geburtsh. Praxis.
1821 to 1825	Dr. Riecke . . .	219,303	51	Velpeau.
1825, 26, 57	Dr. Klugè, Berlin . .	809	8	Siebold's Jour. vols. 7, 9.
1825	Prof. Andrée, Breslau .	351	2	Ibid., vols. 7, 8.
1827	Dr. Küstner, Breslau .	176	2	Ibid., vol. 9.
1829	Dr. Adelmann, Fulda .	57	1	Ibid., vol. 11.
1797 to 1837	Dr. Jansen, Ghent . .	13,365	5	Med. Gazette, March 6, 1840.
1847 to 1849	Dr. Arneth, Vienna. .	6,608	4	Die Geburtsh. Praxis, etc. p. 99.
	M. Klein	35417	53	Ibid.
	M. Bartsch . . .	4,425	3	Ibid.
1821 to 1842	Dr. Ricker . . .	304,150	143	Med. Times and Gazette, Oct. 11, 1856.

Thus among British practitioners, we have 517 crotchet cases in 150,381 cases of labor — or about 1 in 291.

Among the French and Italians, 69 crotchet cases in 38,908 — or 1 in 563¾.

And among the Germans, 386 crotchet cases in 646,645 labors — or 1 in 1675.

Added together, we have 835,934 cases, and 746 in which the crotchet was used — or 1 in 1120½.

RESULTS OF THE OPERATION TO THE MOTHERS.

Authors.	No. of Crotchet Cases.	Mothers died.	Authors.	No of Crotchet Cases.	Mothers died.
Dr. Smellie . . .	44	4	Drs. Sinclair and Johnston . . .	130	26
Mr. Perfect . . .	8	0			
Dr. Jos. Clarke . .	49	16	Dr. Storer . . .	2	1
" P. P . .	12	8	Dr. Beatty . . .	3	0
Dr. Granville . .	8	3	Dr. Churchill . .	11	1
Dr. Ramsbotham . .	34	5	" P. P . .	20	0
Dr. Maunsell . . .	5	2	Mr. Warrington . .	1	0
Mr. Gregory . . .	2	1	Dr. Pagan . . .	15	2
Dr. Collins . . .	79	15	Dr. Siebold . . .	3	1
Dr. Lee, P. P . .	80	4	Dr. Ritgen . . .	1	0
Drs. M'Clintock and Hardy . .	52	8	Dr. Klugè . . .	8	3
			Dr. Andrée . . .	2	1
Dr. M'Clintock, P. P .	5	0	Dr. Küstner . . .	2	0
Dr. F. Ramsbotham .	60	6	Dr. Adelmann . .	1	0
Dr. Murphy . .	2	0	Dr. Arneth . . .	4	2
Mr. Cross, P. P . .	7	0	Dr. Ricker . . .	123	85

This table gives the mortality of 134 in 747 — or about 1 in 5½.

At first sight one would expect the mortality among the mothers to be less after the use of the crotchet than the forceps; although the result of these investigations shows the reverse to be the case, and Dr. M'Clintock, in a very interesting paper, brought forward evidence to show this to be really the case. The only explanation I can give, is founded upon the natural unwillingness of every humane practitioner to destroy life—the consequence of which feeling, is the delay of the operation so long as there is a hope of evading it. This delay, however, is unfavorable to the mother, and when at length the operation is performed, although it may have been less severe than delivery by the forceps, yet her condition has rendered her much more susceptible of injury from it. If we separate the cases in the table which occurred in private or consultation practice, we find the mortality very much less. In consultation I have had recourse to craniotomy twenty times, and all the patients recovered; in four other cases I was called in when the mother was past hope; these I therefore omit. Dr. Robert Lee has recorded eighty cases of craniotomy from disproportion, without complication, and although he was not called to some until much time had elapsed, only four died.

Dr. Joseph Clarke operated twelve times, and all the women recovered. Mr. Cross operated seven times, and all recovered. Dr. M'Clintock, five times, and all recovered.

This gives a result of 117 cases, and 4 deaths, or 1 in 29.

574. The *comparative* advantages of the operation are very decided. In the cases we have supposed, the forceps is useless, and the natural powers inefficient; if, therefore, embryotomy were rejected as inadequate, the only *alternative* would be the Cæsarian section, the mortality of which is much greater, for 1 in 2⅓ of the mothers are lost; and 1 in 3½ of the children.

It would, however, be a serious omission if I did not notice another *alternative* operation, which, although not available after labor has commenced, may supersede the necessity for embryotomy in subsequent pregnancies. I allude to the induction of premature labour. In all cases where pelvic distortion renders craniotomy necessary at the full time, it becomes our duty to recommend the induction of premature labor in subsequent pregnancies, at such a period as shall, if possible, afford a chance of life to the child, or at least save the mother from a severer operation, and not merely to recommend, but to *insist* upon it. No woman has a right to require us to destroy successive children, when an operation like this can supersede craniotomy. The mortality among the mothers is very small, and more than half the children are saved.

575. So much for the positive and comparative advantages of the operation. I am not aware that there can be any just *objections* against it, in suitable cases; but undoubtedly there are most weighty objections against employing it without careful consideration and consultation. In fact, it ought to be deeply impressed upon every practitioner, that he who destroys the child, without due evidence that it cannot be saved, and that this is his only resource for saving the mother, is guilty of murder.

But it may be asked, when the responsibility is so serious, what evidence will be sufficient to satisfy a conscientious practitioner that he may not be committing a crime in his anxious endeavor to afford relief? To this it may be answered:

1. That the continuance of strong labor pain for a certain time, without any advance of the head of the child, is so far evidence of a fixed obstacle to the passage of the child.

2. The failure of a cautious attempt to introduce the forceps will, to a certain extent, demonstrate the amount of the disproportion between the head and the pelvis; and the failure of a careful yet firm attempt at extraction by the forceps (when the application has been effected), will prove that the disproportion cannot be remedied by compression.

3. A well-educated finger will enable us in most cases to ascertain whether the diameters of the pelvis are such as will allow of the passage of a living child. And even though this mode be uncertain, we have a means of correcting our estimate, by comparison with the child's head, in opposition with the pelvis. If the natural efforts after several hours, or the forceps with a proper and safe amount of compression and force, cannot bring the widest part of the head of the child through the narrow part of the pelvis, we may fairly conclude that the only resource is craniotomy.

4. The general condition of the mother will also aid our decision. If she be much exhausted, if fever be present, the uterus powerless, the life of the child doubtful, and the success of the forceps dubious, we may shrink from inflicting the double shock of an unsuccessful application of the forceps, and subsequent delivery by the crotchet. But these cases are very rare; they only happen when the patient has been mismanaged, and it requires experience and judgment to decide upon the propriety of terminating them by embryotomy.

A careful consideration of these circumstances will, I think, enable us to arrive at a correct conclusion in an individual case; and as the responsibility incurred in the destruction of the infant may lead to timidity, it should also be remembered that hesitation to act when the case is clear, involves a more fearful responsibility, by compromising the life of the mother.

576. The *cases* in which the operation is demanded are those in which the child is dead, or in which the character of the labor will involve its death, or in which it cannot be delivered alive by any means compatible with the safety of the mother. The limits of the operation are rightly restricted on the one hand by the extended use of the forceps, the induction of premature labor, and in certain cases by version; and on the other hand, by the employment of the Cæsarian section. Within these limits, the cases suitable occur.

1. When the child is dead and the labor tedious. But we must be quite sure that the child *be* dead, before this is made the ground of interference. If the head be putrid, and there is space in the pelvis, it is much better to

use the forceps, as the bones and integuments of the skull give way so easily under the crotchet, that it is sometimes very difficult to extract the child. I have seen the operation prolonged two hours from this cause alone.

2. In some cases of convulsions, rupture of the uterus, etc., where immediate delivery is necessary, *and where the forceps cannot be applied*, craniotomy must be performed.

3. In flooding cases, before the head has passed through the os uteri, if the cervix be dilatable, the child may be thus delivered; and this is peculiarly desirable when the flooding is large and the child premature. Of course it cannot be attempted when the placenta covers the os uteri, nor must we have recourse to it unless the woman is endangered by the hemorrhage. In these two latter classes of cases, the child dies in most cases before we could possibly deliver it by any other means.

4. In distortion of the pelvis, when the antero-posterior diameter of the brim is less than three inches, we have no chance of delivery by the natural efforts or by the forceps; so that to save the mother we must destroy the child.

5. When the transverse diameter of the lower outlet is diminished to the same extent by the approximation of the tubera ischii, if the forceps applied antero-posteriorly are insufficient to move the head, we must have recourse to craniotomy.

6. When the calibre of the pelvis is diminished to a certain degree by a fixed obstacle — as, for example, a fibrous tumor, or an exostosis growing from the bone or periosteum, it may not be possible for the natural efforts alone, or aided by the forceps, to expel the child. In such cases it will be necessary to lessen the head and apply the crotchet. In these three latter class of cases, the passage through the pelvis may be so much diminished as to render it necessary to break up the skull, or to eviscerate the child.

7. In some cases of ovarian disease, where the tumor has formed adhesions within the pelvis, so as to prevent its being pushed above the brim, it has been found necessary to lessen the head, before the child could be extracted. We are not, however, to decide upon this measure until the natural powers have had a fair trial, as it sometimes happens, that in the progress of labor the tumor is so much displaced as to allow of the passage of the child. Further, before sacrificing the infant, we ought to ascertain whether the contents of the tumor may not be drawn off, by passing a long trochar into it. If a small quantity of fluid escape, it may allow of the application of the forceps, and so enable us to save the child. If, however, the tumor prove to be solid and immovable, we must, as a "*dernier ressort*," have recourse to the perforator and crotchet.

8. When the child is hydrocephalic to such an extent as to prevent its entering or passing through the pelvis, whether distorted or of the natural size, there can be no question of the propriety of opening the head.

9. If an arm descend along with the head, the diameters of which correspond closely to those of the pelvis (whether the latter be of the usual size or not), it may be necessary to terminate the labor by opening the head.

10. I have already alluded to a class of cases, where, from mismanagement, the patient has been allowed to continue too long without help, and in consequence is greatly exhausted, with fever, quick pulse, delirium, etc. In such cases the patient will soon die if she be not assisted; and from the unfavorable state in which she is, she cannot bear a prolonged or very painful operation. Now if there be sufficient space for the forceps, they ought to be preferred, and it would be very wrong to use the perforator; but if this be doubtful, and the probabilities against our succeeding with that instrument, then the consideration of the patient's inability to bear a severe operation may in some cases decide us in favor of embryotomy.

These cases, however, are but few, and they must be well marked, to justify our adopting at once such extreme measures.

11. In footling or breech cases, when the head (separated or not from the body) cannot be extracted, we must evacuate its contents.

577. The next question to be decided is the *period of labor* at which the operation should be performed.

1. In all cases where the diminution of the pelvic diameters is so great as to render it impossible that a living child can be born naturally or extracted, there can be no hesitation in recommending that the head should be opened at an early period of the labor, say as soon as the os uteri is dilated or fully dilatable. By this means we shall afford a chance of the completion of the labor by the natural powers, as there can be no objection to waiting a few hours before extracting the child.

2. When the distortion is less, we cannot be sure as to the result of the natural efforts, and we must wait until it is evident that they are inadequate; then an endeavor should be made to use the forceps, and if this fail, there should be no delay in the performance of embryotomy.

3. These observations will apply equally to the case of morbid growths, ovarian disease, etc., obstructing the passages.

4. In cases of convulsions, ruptured uterus, etc., the time for the operation is determined by circumstances connected with those accidents, and which will be found laid down in the chapters on the subject.

5. In cases where the child is dead, there need be no delay in performing craniotomy as soon as the delay in the labor renders it desirable.

[In the first volume of the Transactions of the Obstetrical Society of London, published 1860, there is a very elaborate and highly interesting paper by Dr. W. Tyler Smith, "On the Abolition of Craniotomy from Obstetric Practice in all Cases where the Fœtus is Living and Viable."

It is upon the extension and development of three great conservative measures — the use of the forceps, turning, and induced labor — that Dr. Smith insists the diminution and abolition of craniotomy must mainly depend.

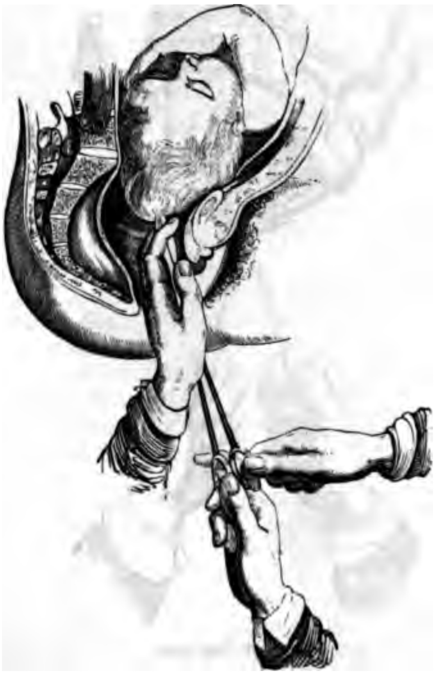
"Although," he remarks, "I would contend for the abolition of craniotomy in the case of living children, as a rule of practice, believing firmly that it may always be avoided if we properly develop the whole of the resources at our command, I am not so Utopian as to expect that cases will not occasionally be met with in practice, in which perforation of the living child will not only be necessary, but a positive duty. Cases will occur of deformity overlooked, of impaction from delay, and swelling of the soft parts, of malpositions and malpresentations unrectified, and other forms of dystocia, in which such a point of difficulty has been reached, that either the mother or the child must be sacrificed. Under such circumstances, it would be the bounden duty of the accoucheur to craniotomize rather than allow the mother to perish.

"But I believe that such deplorable contingencies need never occur, and that cases of this kind, when they do happen, ought to be considered as depending on some error or neglect, and to be held only as exceptions to right practice. Nothing will tend so much to diminish or prevent such cases, as the establishment of the non-necessity of craniotomy as the rule of practice. Considering the various means at our disposal in the way of preventing the necessity for craniotomy, I do not hesitate to express my strong conviction that, as the rule, craniotomy in the case of the living and viable child should be abolished, and that if all the resources of obstetrics, in the way of prevention, management, and alternative treatment, were properly wielded, the necessity for the operation would never occur. There is no department of medicine in which, looking to what has been already done, there is more reason to be proud and hopeful for the future, than obstetrics."

After referring to the fact that, in London, previously to the year 1670, the deaths from child-birth, was 1 in 39, whereas it is now rather less than 1 in 200,—showing that two centuries ago, more than *five* women were lost in child-bed where but *one* now perishes, Dr. Smith remarks, that, "looking to the results obtained by the most successful practitioners, there are good grounds for expecting that the deaths from child-birth may ultimately be reduced to less than 1 in 1000. No class of cases admits of improved management to a greater extent than instrumental labors, and of these craniotomy cases are by far the most fatal." If the facts and arguments adduced by him are of any value, Dr. Smith believes that they show that "the diminution or abolition of craniotomy must greatly diminish the loss of maternal, as well as of fœtal life. Rightly considered, the interests of the mother and child rarely if ever come into collision. With the one exception of high pelvic deformity, it may be laid down as a moral axiom in obstetrics, that the treatment which most certainly assures the safety of the child, is also the safest for the mother."]

578. **Mode of operating.**—It is not absolutely necessary for the operation that the os uteri should be fully dilated, though it is a great advantage, and greater care will be required when this dilatation has not taken place.

Fig. 147.



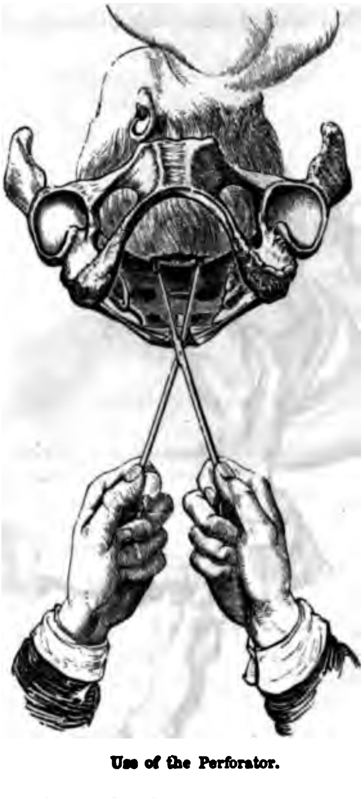
Use of the Perforator.

The rectum and bladder are first to be evacuated; the patient is then to be placed on her left side, with the hips over the edge of the bed, and an assistant beside her, to fix and steady the abdomen.

One or two fingers of the left hand are then to be introduced into the vagina, and their extremities fixed upon that part of the head of the child which is to be perforated. Contrary to ancient practice, this should never be the sutures, because after the opening is made in that situation, the bones collapse and close it. Having determined upon the situation, the perforator is to be passed along close to the palm of the hand and the inside of the fingers, so as to avoid injury to the soft parts of the mother.

Having arrived at the point of insertion into the skull, guided and guarded by the fingers of the operator, the perforator is to be pressed firmly forwards with a semi-rotatory motion, until it pierce the bone (fig. 147); it is then to be passed in up to the shoulders, and the handles are to be separated by an assistant as widely as possible (fig. 148). The cutting edges of the scissors are then to be placed at right angles with the first incision, and again separated, so as to make a crucial incision. This being effected, the perforator is to be passed into the skull, the brain thoroughly broken up, and the medulla oblongata cut across. The scissors are then to be withdrawn, and the first part of the operation is complete.

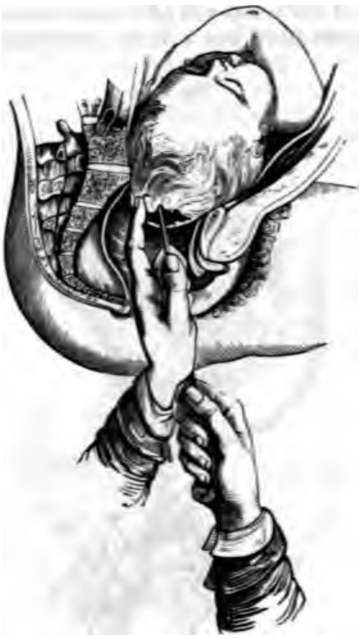
Fig. 148.



Use of the Perforator.

The left hand is again to be introduced, as a guide and guard to the crotchet, which should be passed into the cranium for the purpose of completely breaking up the brain. When this object is attained, if we wish to terminate the operation at once, the crotchet may be fixed on the outside or inside of the head; the former was adopted by the older practitioners, but the latter is recommended generally at present (fig. 149). In some cases it is useful to employ two crotches — one internally and the other externally. The scalp should be carefully folded over the edges of the bones, in order to prevent injury to the passages, and then extracting force must be gradually and steadily applied during the pains, or at intervals, in imitation of them, in the axis of the outlet through which the head is passing: the left hand remaining in the vagina, and two fingers, being placed on the head, opposite to the insertion of the crotchet, both for the purpose of steadying it and of preventing mischief, if the instrument should slip. If the part of the skull in which the crochet is fixed give way, we must obtain another purchase. The amount of force, and its continuance, will depend of course upon the resistance to the passage of the child; but if, after a certain time, no progress be made, in order to avoid contusion of the soft parts of the mother, it will be well to break up the skull with the forceps adapted for that purpose (fig. 138). The perineum must be carefully guarded, and care must be taken that no injury be inflicted by the spiculæ of bone.

Fig. 149.



Application of the Crotchet.

After the head is extracted, the body generally follows without much difficulty; but should this not be the case, we must have recourse to evisceration. The scissors must be plunged into the chest, and the contents broken up: the crotchet hooked upon the ribs, and traction exerted. The contents of the abdominal cavity may be evacuated in a similar way, and after this we shall generally be able to extricate the child.

If the craniotomy forceps be used, one blade must be passed into the skull, and the other on the outside, and sufficiently far to secure a firm hold (fig. 150); the blades then being closed, the operator must draw down firmly, yet gently, and at intervals.

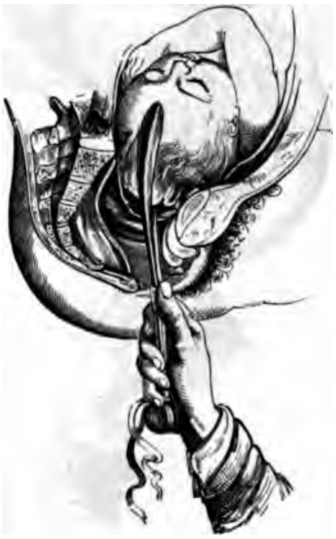
In the plate I have placed the instrument on the forehead of the child, in order to show its application; as a general rule, however, we would seize the occiput with them, unless there be special reasons for preferring some other part.

579. The principal *difficulties* of the operation are as follows:

1. If the bones of the skull be very firm, it is not easy to perforate, and the point of the scissors is very apt to slip. This can only be avoided by great care and steadiness.

2. A similar state of the bones will offer a serious obstacle to the insertion of the point of the crotchet; but a little perseverance will in most cases overcome it. The fingers of the left hand placed on the outside of the skull, will render it still more easy.

Fig. 150.



Application of the Crotchet.

3. The extraction may be difficult. If the narrowing be not too great, the difficulty may be overcome by steady force; but if such a degree as may be exerted with impunity do not move the head, we must then break up the skull, as already stated.

580. The *dangers* to which the patient may be exposed in this operation are more serious than when the forceps is used.

1. The perforator may slip, and the vagina or uterus be wounded.

2. The hook may slip, or the bone in which it is fixed may suddenly give way; and if the hand of the operator be not interposed, a severe, or even fatal rent may be inflicted.

3. The perineum may be lacerated by the injudicious exertion of extracting force.

4. From the condition of the patient, she generally suffers more from the shock to the nervous system, than in the operations previously described.

5. There is also greater danger of subsequent inflammation of the womb or vagina, with perforation of the bladder, especially if much force have been necessary.

After-treatment.—The nervous shock will be best remedied by quiet, small doses of opium, and moderate stimulation.

The state of the vagina and uterus should be carefully watched, and vaginal injections of warm water used occasionally.

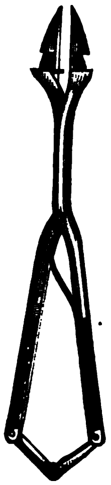
If any symptoms of inflammation arise, they must be met promptly by the appropriate remedies,—venesection, leeching, calomel, and opium, etc.

In other respects, if the patient go on well, she must be treated as after natural labor.

[*Cranioclasm.*—Dr. Simpson, of Edinburgh, has proposed, in cases where labor can be accomplished only by a reduction of the size of the child's head, an operation which he denominates cranioclasm. He believes it to be an easier, safer, simpler, and shorter operation than the ordinary one of craniotomy, and one which, inasmuch as it is adapted to dislocate and break up the bones composing the basis of the cranium, diminishes to a much greater extent the size of the child's head, facilitating thus, its passage through a very contracted pelvis, in which case alone is the breaking up of the head justifiable.

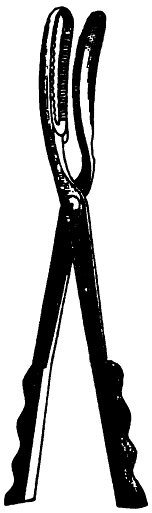
In the performance of cranioclasm the instruments required are, 1, a *perforator*, to open the head (fig. 151), and 2, a *cranioclast*, to break down the skull, and extract the head through the pelvis (fig. 152).

Fig. 151.



The Perforator.

Fig. 152.



The Cranioclast.

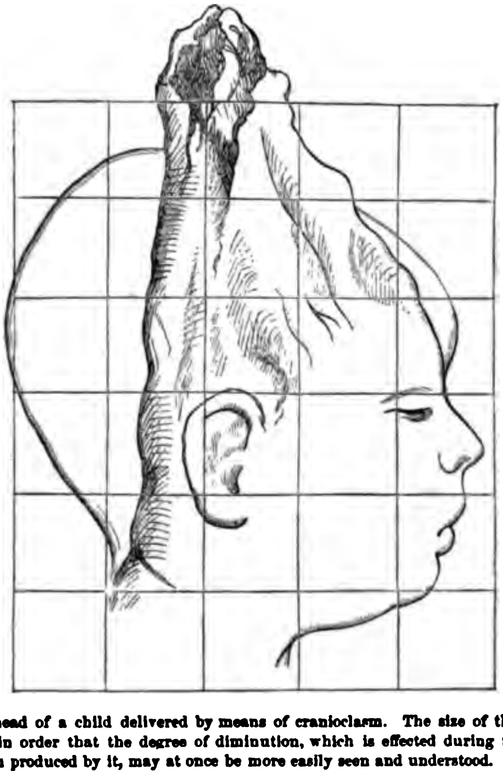
The perforation of the head is effected in the same manner and according to the same rules, precisely, as in the operation of craniotomy.

The perforator used by Dr. Simpson is so constructed that the blades can be separated by the simple approximation of the handles. As this can be done with one hand, the other is left free to guide and guard the point of the instrument, rendering the assistance of another practitioner or a nurse unnecessary. The ends of the handles are kept apart, during the passage of the point through the skull, by means of a hinged bar, which allows of the ready approximation of the handles, and consequent separation of the blades, without it being necessary for the operator to stop, after the instrument has pierced the skull, to remove the straight solid bar which, in Naegelè's perforator, is used to keep the extremities of the handles asunder. Dr. Simpson has, also, usually had the instrument made with an angled indentation at the base of each of its cutting edges or sides. These lateral indentations prevent the point and edges from readily slipping out of the skull when the instrument is opened, an accident which has sometimes happened under the use of the common form of the perforator or perforating scissors.

The cranioclast is of the usual length and weight of the guarded craniotomy forceps employed in British practice—being about 13 inches long,—5½ inches from the tip to the middle of the button joint; its outer blade, at its broadest point, one inch, and its inner blade, of course, somewhat narrower: and the exterior of the length of the fenestra of the outer blade, about three inches. It is a kind of forceps with a movable button joint, so as to allow the instrument to be introduced either in a fixed form with the blades conjoined, or each blade separately, like the common midwifery forceps. The inner or smaller blade is solid and convex, and serrated on the side by which it fits into the concavity of the other larger fenestrated blade. Both have a slight curve to enable them to be adapted to the curved form of the bones of the cranial vault. The concave surface of the outer fenestrated blade, and the convex surface of the inner solid blade, are serrated with relative transverse ridges and grooves, so as to make the hold of the instrument as perfect as possible without the fear of lacerating the included tissues.

In using the instrument, the smaller solid blade is first introduced, through the opening made by the perforator in the vault of the skull, very deeply into the interior, and then the other, or fenestrated blade, being passed over the occiput outside the scalp, the two are made to lock, after they have been pushed in this position as far down over the occiput as they can be made to

Fig. 153.

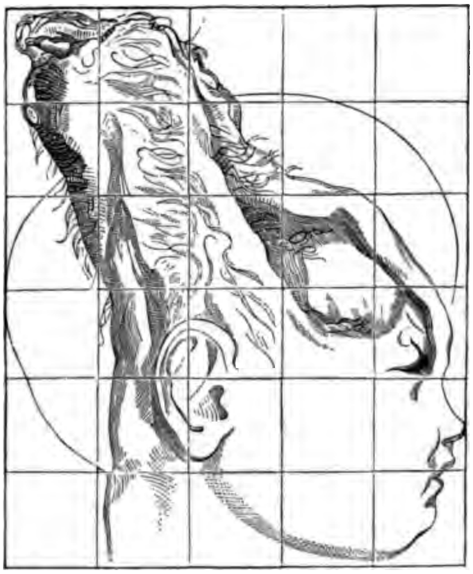


Sketch of the head of a child delivered by means of cranioclasm. The size of the normal head is shown in outline in order that the degree of diminution, which is effected during the operation, and the change of form produced by it, may at once be more easily seen and understood.

go. Then, by a slightly twisting movement, first on the one side and then on the other, the bone is at once and easily broken across, or dislocated behind the foramen magnum. This may sometimes be all that is required. In other cases it will be necessary to pass round the blades of the instrument over the parietal bones, so as to loosen and comminute in the same way the temporal bones, or it may be found advisable to break away the frontal bones from their base, or from connection with the sphenoid.

An idea of the extent to which the base of the skull may be and has been reduced by means of the cranioclast, may be obtained by merely looking at the annexed sketches (figs. 153, 154), which shows at once the great change in shape and size which the head has undergone during the process of cranioclasm.

Fig. 154.



Sketch of cast of the crushed head of an infant delivered by means of cranioclasm, and of the same head in a re-distended state. (Half the natural size.)

The artificial extraction of the child is not necessary in all cases of cranioclasm. Occasionally, after the head has been reduced in size, the normal uterine contractions are sufficient to expel the fœtus. In the vast number of cases, however, the immediate artificial extraction of the child will be called for, especially if the operation of cranioclasm, as will generally be the case, has been deferred until the patient's constitution shows, more or less markedly, signs of distress and suffering.

Extraction may be effected by the cranioclast, in some instances, without even shifting it from its position over the occipital bone, where, in most cases, it is first to be applied. In experimenting with the instrument as an extractor, Dr. Simpson has rarely or never seen it slip when a sufficient hold was taken, and the previous comminuted condition of the cranial walls is not such as to prevent them from serving as a sufficient and safe medium of prehension and traction. In some cases the sides of the skull may afford a better and more secure hold than the occipital region. The following are the advantages, which, according to Dr. Simpson, cranioclasm has over craniotomy. 1. It is, particularly in cases of any considerable deformity and difficulty, far speedier and simpler in its performance than craniotomy. 2. It saves the maternal passages from the danger of injury and laceration, caused by the successive withdrawal of portion after portion of the broken and separated cranial bases, as is generally requisite in craniotomy. 3. It diminishes the size of the fœtal head much more effectually than can be accomplished by craniotomy. 4. By craniotomy we cannot fracture and reduce the size of the hard bases of the fœtal skull, as we can by cranioclasm. 5. Hence we have ultimately the head in cranioclasm so much reduced that we can extract it both much more easily for ourselves, and, consequently, also more safely for the mother.[1]]

CHAPTER XIV.

OBSTETRIC OPERATIONS.—6. THE CÆSARIAN SECTION, OR HYSTEROTOMY.

581. So far, I think, our investigations have fully borne out an observation made in a former chapter, viz., that obstetric operations formed an ascending series—each one exceeding the other in importance and danger; and that whilst no two could be compared in terms of equality, the value of each was shown by its alternative, which is always one of greater danger. Thus the mortality of premature labor is less than its alternative, the crotchet; that of the forceps less than the crotchet; and we shall now see that inasmuch as when it is employed early, the safety of the mother is nearly secured, the danger of embryotomy to her is far less than that of the Cæsarian section. This operation is indeed the *dernier ressort* of midwifery. Preferable as it is to the certain death of both parties, it is far more serious in its consequences than any other operation. It comes under the class of operations already noticed, in which the life of mother and child are necessarily more or less compromised.

It is of very ancient date, being known to the Greeks, and called ὑστεροτομοτοκίη, or ἐμβριοελκη; but I believe by them only employed after the death of the mother. From the circumstances of several remarkable personages having entered the world in this way, it was deemed fortunate to be so born—a royal road, in short, to distinction. Pliny has recorded that Scipio Africanus was thus extracted. He says, "Auspicatius enecta matre nascuntur, sicut Scipio Africanus prior natus." He is not correct, however, in stating that Scipio was the first thus brought into this world; Claudius Cæsar, who distinguished himself in the war with the Samnites, having preceded him. From being thus "cut out" of their mother's womb, these individuals were first termed "Cæsones," afterwards "Cæsares," on the authority of Pliny, Festus, Pompeius, Solinus, etc. "Quia cæso matris utero in lucem prodiscunt." Cæso Fabius, who was three times consul, was thus extracted. Julius Cæsar is also stated to have been brought into the world by means of this operation, although it is an error to state that the name Cæsar was given to him on this account, inasmuch as he inherited it from his father. Among the ancients, persons thus born were considered sacred to Apollo, to which Virgil alludes in the lines—

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[1] [Clinical Lectures on the Diseases of Women, by J. Y. Simpson, M. D., London Med. Times and Gazette, May 8, June 9, 1860.]

> "Unde Lycham ferit exsectum jam matre premtâ
> Et tibi, Phœbe, sacrum."—ÆNEID, x. 815.

Thus Æsculapius was called the son of Apollo, because (it is said) he was brought into the world by hysterotomy. For this reason, also, those things in Rome which were sacred to Apollo were preserved by the family of the Cæsars.

Some modern historians have included Edward VI., King of England, among those who benefited by this operation, and this statement is repeated in some works on midwifery. I have taken some trouble in tracing this story, and I find no reason to believe it to be true. Sir John Hayward, in his Life and Reign of Edward VI., was the first to put it upon record. He says, "All reports do constantly run that he was not by natural passage delivered into the world, but that his mother's body was opened for his birth, and that she died of the incision the fourth day following." That the latter statement is inaccurate, is proved by an examination of a MS. of the ceremonies of her funeral. Queen Jane Seymour died Oct. 24th, 1537, twelve days after King Edward's birth. With regard to the mode of the king's entrance into life, I shall quote the words of the compiler of these memoirs. In the note he observes, that Sir John Hayward was the first to record the fact, "for none of our historians that wrote before Hayward give any countenance to this, but only mention her departure soon after, except it be Sanders, (whose pen was not directed so much by truth as malice,) who frames a story, that when the Queen was in extreme labor, they asked the King whom he would have spared—the Queen or his son? He answered, his son, because he could easily find out other wives. But yet even he has not a word of cutting the young infant out of his mother's belly." This story is manifestly fabulous, inasmuch as the fact of the infant being a son could not be known before its birth, and otherwise the point intended by it would be without force, because the king had already a daughter. The commentator adds, "that Dr. Burnet, now Bishop of Salisbury, mentions original letters in the Cotton Library, that show how the Queen was well delivered. These letters are exemplified in Fuller's Church History, the one from the Queen herself and the other from her physicians, both written to the Privy Council." This evidence, I conclude, sets the question at rest, and I ought perhaps to apologize to my readers for occupying so much time with it; but it appeared to me to be well to ascertain the truth about it.

There is also a tradition that Robert II., King of Scotland, was born by the Cæsarian section, an accident having happened to his mother.

To return to the regular history of the operation.

Rousset, about 1581, published a treatise on the Cæsarian section, in which he quotes ten successful cases. On one of the patients the operation was performed six times; she became pregnant a seventh time, and no one being willing to operate, she died undelivered. His essay was translated into Latin by Bauhin, 1661, and may be found in Stach's collection. To this work of Rousset's, Bauhin added an appendix of cases; he states that he saw the operation performed seven times.

There is no doubt that in many of these cases the operation was unnecessary; and one cannot feel quite sure of the trustworthiness of the reports of the cases. Mauriceau even asserts that "that which Rousset reports of the Cæsarian section is nothing but the ravings, capriciousness, and imposture of their authors."

There is no mention of the operation in Raynalde's work on the Byrth of

Mankynde (1634), nor in the Childbearer's Cabinet, so that we are indebted to the French and Germans for our earliest information on the subject.

Ambrose Paré, whose work was translated in 1634 (having been written in 1570), was opposed to the performance of the operation on the living woman, on account of the danger of hemorrhage, but recommends it for the purpose of saving the child when the mother has died suddenly.

In the translation of Guillemeau's work, 1635, there is a chapter on the Cæsarian section, which is recommended immediately after the death of the woman, "that thereby the child may be saved, and receive baptism." "In some women," the author observes, "I have made this practice very fortunately, and among the rest, in Mad. le Mabre, M. Philippes, my uncle, being joined with me; and likewise in Mad. Pasquier, presently after she was dead, Mons. Paræus and the Curate of St. Andrew being present." As to performing it on living women in difficult labors, he says, "which for my owne parte I will not counsell any one to, having twice made tryall of it myselfe, in the presence of Mons. Paræus, and likewise seene it done by MM. Viart, Brunet, and Charbonnet, all excellent chirurgions, and men of great experience and practice, who omitted nothing to do it artificially and methodically. Nevertheless, of five women in whom this hath been practised, not one hath escaped. I know that it may be alledged that there be some that have been saved thereby; but though it should happen so, yet ought we rather to admire it, than either practise or imitate it" . . . . . "After Mons. Paræus had caused us to make trial of it, and seene that the success was very lamentable and unfortunate, he left and disallowed this kind of practice, together with the whole colledge of Chirurgions of Paris."

In Chamberlen's translation of Mauriceau (1672), we find a strong protest against performing the operation on living women, and great doubts expressed as to its having ever been successful. He admits its utility when the mother is dead.

Dionis, whose work was translated in 1719, has a chapter on the Cæsarian section, which he recommends when the woman is dead, but deprecates it during her life. He describes the operation minutely.

Sir. F. Ould, 1742, is the first British author I possess who notices the operation, which he says may be performed "either while the mother is living, or after her death, according to the nature of the circumstances." Nevertheless, he observes that the "Cæsarian operation is most certainly mortal, as we shall endeavor to prove presently from reason and the nature of the thing; and I hope it will never be in the power of any one to prove it by experience."

La Motte's work was translated in 1746. He neither discredits the cases related by previous authors, nor doubts the possibility of success; but he observes, "the os sacrum, ischium, and pubis, being from their first conformation so close to one another, that the surgeon can hardly introduce a few fingers between them, it being consequently impossible for the child to come through, is the only case where this operation is to be put in practice."

Burton, in 1751, entered into a more minute detail than any of his predecessors, and gives references to cases. He concludes, that "seeing, therefore, both reason and repeated experience confirm the possibility of success in this operation, nothing should deter a skilful operator from performing it when it is absolutely necessary."[1]

Smellie, 1751, takes, as usual, a sound common-sense view of this matter: "When a woman," he observes, "cannot be delivered by any of the methods hitherto prescribed and recommended in laborious and preternatural labors, on account of the narrowness or distortion of the pelvis, into which it is sometimes impossible to introduce the hand; or from large excrescences or glandular swellings, that fill up the vagina and cannot be removed; or from large cicatrices in that part and at the os uteri, which cannot be separated; in such emergencies, if the woman is strong and of a good habit of body, the Cæsarian operation is certainly advisable, and ought to be performed; because the mother and child have no other chance to be saved, and it is better to have recourse to an operation which has sometimes succeeded, than leave them both to inevitable death."[1]

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[1] A New System of Midwifery, p. 272.

The operation is described by almost all authors, both English and Continental, but with considerable difference of opinion, both as to its usefulness and the cases to which it is applicable. I shall not, however, occupy the reader with further detail, but again refer him to my researches on Operative Midwifery for those minute particulars which would be misplaced here.

582. After this short sketch, we may proceed to consider the operation itself, its object, and the means for attaining it.

The *objects* of this very formidable operation are of extreme importance.

1. To afford a chance of escape to the mother, and of life to her offspring, in cases where the child cannot be extracted through the natural passages by any means at our command, or in cases when the extraction, if completed, would be almost certainly fatal to the mother. As to using it as an ordinary substitute for craniotomy, the proposal is simply absurd. If the reader will turn to the appendix, he will find the question investigated at length.

2. To extract the child so promptly, as to afford it a chance of life, when the death of the mother has taken place suddenly.

3. To relieve the mother from the risk of fatal inflammation, owing to the presence of the fœtus in the abdominal cavity acting as a foreign body.

583. The *nature* of the operation by which these objects are to be effected is simple, viz., that of cutting through the abdominal and uterine parietes, so as to come at the child, and then removing the entire contents of the uterus, and closing the external incision by sutures and sticking-plaster.

But though so simple, it is most dangerous. Wounds of the peritoneum of the simplest kind, though not necessarily and invariably fatal, are very frequently so. In most cases, inflammation of the serous membrane has followed, and in very many it has terminated in death. There is another source of danger. If the wound in the uterus should not be completely closed by its contraction, hemorrhage to a fatal amount, from the uterine sinuses, may occur, though it is not so frequent as was supposed by the earlier writers. This appears to have been the cause of death in the cases related by Dr. Cooper and Mr. Thompson.

The formidable nature of the operation, however, only makes it the more necessary to ascertain clearly the grounds upon which it is justifiable. It is sufficiently evident, from what has been already stated, that the older practitioners performed it unnecessarily; this is proved, I say, by the fact that the same woman bore children afterwards without assistance. Now, it is an established axiom in midwifery, that the mother's life is not to be compromised in order to save the child. A certain amount of risk may be fairly incurred, but beyond this, the safety of the mother is to be secured, because that is in our power, and if necessary, the child sacrificed, because it cannot certainly be saved without sacrificing the mother. In no cases where the mother's security can be so purchased, can we be justified in having recourse to the Cæsarian section; but there are cases on record, where the pelvic outlets are so narrowed by distortion, that a mutilated child could not be dragged through. In Mr. Thompson's case; the antero-posterior diameter of the upper outlet was only ⅞ths of an inch. In Dr. Cooper's second case it was 1¼, and the transverse diameter of the lower outlet only ½ an inch. In Dr. Young's case, the antero-posterior diameter of the upper outlet was 1¾ inch. In a skeleton in Dr. Hamilton's possession it was only ¾ths of an inch. In one of Dr. Hull's cases (Ann Lee) the conjugate diameter, taken from the symphysis pubis to the projection of the sacrum was 1⅝ inch, and from the acetabula to the projection of the sacrum, 1 9/16ths inch on each side. In the other case (Isabel Redman), the passage was narrower, though the deformity was different. "Out of 80 cases, the operation was necessitated by narrowness of the antero-posterior diameter of the pelvis in 62.

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[1] Midwifery, vol. i. p. 239, 6th ed.

Thus it was	1	inch in	1 case.
	1½	" in	8 cases.
	1½ to 2	" in	23 "
	2 to 2½	" in	25 "
	2½ to 2¾	" in	5 "[1]

It is quite plain that a fœtus, ever so much mutilated, could not pass through some of these pelves, nor through any without great efforts.

Dr. Osborn, who was extremely cautious, and had a great horror of this operation, has fixed 1½ inch antero-posterior diameter, by 3 transverse, as the smallest space through which a child, after evacuation of the contents of the cavities, and the breaking up of the cranium, could be extracted by the crotchet; but others have deemed this impossible. Certainly great risk of injury to the soft parts of the mother would be incurred by the force necessary to drag the fœtus through so small a space, not quite, perhaps, but nearly equal to that resulting from the Cæsarian operation. Moreover, there are cases on record by Drs. Shekelton and M'Clintock, in which a child was extracted through a pelvis whose diameter was about that fixed upon by Dr. Osborn, and the mothers died, one immediately, and the other within twenty-four hours. In such cases, I agree with Dr. Murphy, that the risk of the Cæsarian section would be less for the mother, and we should give the child a chance.

I should, therefore, conclude that when, from any cause, the antero-posterior diameter of the upper outlet, or the transverse diameter of the lower, is not fully 2½ inches, there is no possibility of delivery "per vias naturales," with safety to the mother, but that we must have recourse to the Cæsarian section.

[Dr. Meigs believes that the operation may be demanded in different diameters in different cases, and that it is impossible to fix a minimum diameter through which a female may be delivered. In diameters of an inch or an inch and a half the Cæsarian section is of course inevitable. Dr. Meigs, however, would not hesitate to recommend it in a pelvis the diameter of which ranged from two to two and a half inches, where the patient is in imminent danger of sinking, while in another and less pressing case—with the same pelvic dimensions — where the patient had sufficient strength left to bear the operation of craniotomy, he would as certainly advise the latter in preference to the Cæsarian section. Dr. Meigs relates a case where the diameter of the pelvis was not beyond two inches, in which he delivered by embryotomy on two occasions, and in which the Cæsarian operation was subsequently performed twice, successfully as to both mother and child—no change in the condition of the pelvis having taken place in the meantime.]

584. STATISTICS.—But it may fairly be asked, what chance does so serious an operation afford to either mother or child? The only mode of answering this question is by adducing the evidence on record. The following tables contain a list of British and American operations, successful and unsuccessful.

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[1] Velpeau, Traité des Accouch., p. 447.

I. UNSUCCESSFUL CASES.

No.	Date.	Operator or Authority.	Patient's Name.	Hours in Labor.	Cause.	Results to Mother.	Results to Child.	References.
1	1737	Mr. R. Smith, Edinburgh	Paterson	7 days	. . .	died	dead	Smellie's Mid., vol. iii. p. 428.
2	1778	Professor Young	. . .	. .	. . .	"	alive	MS. Lectures.
3	. .	Dr. White, Manchester	. . .	. .	. . .	"	dead	Hull's first letter.
4	. .	Mr. Wood, Edinburgh	. . .	. .	. . .	"	"	Ibid.
5	1769	Mr. Thompson, London	Martha Rhodes	24 hours	. . .	"	alive	Med. Obs. and Enq., vol. iv. p. 261.
6	1778	Professor Young	. . .	. .	. . .	"	"	MS. Lectures.
7	1774	Dr. Cooper, London	Eliz. Foster	2 days	moll. ossium	"	"	Ibid., vol. v. p. 218.
8	1774	Mr. Chalmers, Edinburgh	Eliz. Clarke	12 days	. . .	"	"	Hamilton's Outlines, p. 389.
9	1774	Mr. John Hunter	. . .	. .	. . .	"	"	Med. Obs., vol. v.
10	1775	Mr. Whyte, Glasgow	. . .	. .	. . .	"	dead	Hull.
11	1777	Mr. Atkinson, Leicester	El. Hutchinson	8 days	moll. ossium	"	alive	Hull, p. 67.
12	. .	Mr. Clarke, Wellingborough	. . .	3 days	. . .	"	dead	Mem. Med. Soc., vol. v.
13	1794	Dr. Hull, Manchester	Isabel Redman	12 hours	moll. ossium	"	saved	First Letter, p. 162.
14	1798	"	Ann Lee	10 days	. . .	"	dead	Ibid., p. 172.
15	1795	Dr. Hamilton, Edinburgh	Jean Douglass	2 days	malacosteon	"	alive	Outlines.
16	1798	Mr. Kay, Forfar	. . .	3 days	"	"	"	Hull's letter.
17	1799	Mr. Wood, Manchester	El. Thompson	. .	distortion	"	saved	Mem. Med. Soc., vol. v.
18	1800	Mr. John Bell, Edinburgh	. . .	. .	. . .	"	"	Med. Chir. Trans., vol. iv. p. 347.
19	. .	Mr. Dunlop, Rochdale	Susan Holt	. .	. . .	"	alive	Hull's Baudeloc., p. 184.
20	. .	Mr. Wood	H. Rheubotham	. .	. . .	"	dead	Med. and Phys. Journal, vol. vi. p. 346.
21	. .	Dr. Kellie, Leith	. . .	24 hours	. . .	"	"	Ed. Jour., vol. viii., p. 11.
22	. .	Mr. Kinder Wood	. . .	. .	. . .	"	"	Med. Chir. Trans., vol. vii. p. 264.
23	1813	Dr. Wallis	. . .	48 hours	tumor	"	saved	Med. Times and Gazette, March 12, 1858.
24	1817	Barlow and Cort	Ann Hacking	. .	. . .	"	alive	Barlow's Essays.
25	1821	Barlow and Dugdale	Mrs. Ridgedale	. .	. . .	"	"	Merriman, p. 317.
26	. .	Dr. Henderson, Perth	Mrs. Lowe	18 hours	distortion	"	"	Ibid.
27	1820	Dr. Radford, Manchester	Mary Ashwell	34 hours	"	"	dead	Ed. Journal, No. 146.
28	1821	"	Mary Nixon	19 hours	"	"	"	Ibid.
29	. .	"	. . .	. .	"	"	lost	Pamphlet, 1849.

II. UNSUCCESSFUL CASES—CONTINUED.

No.	Date.	Operator, or Authority.	Patient's Name.	Hours in Labor.	Cause.	Results to Mother.	Results to Child.	References.
30	1848	Dr. Merriman	. . . .	. .	. . . .	died	saved	
31	1851	Dr. Shipman	. . . .	. .	tumor	"	dead	Amer. Jour., vol. xviii. p. 122.
32	1843	Drs. Cyrus Falconer and Goodman .	. . . .	. .	. . . .	"	saved	Amer. Jour. N. S., vol. vi. p. 264.
33	. .	Dr. Radford	Betty Wilcock	60 hours	distortion	"	twins saved	Assoc. Jour., Jan. 19, 1856.
34	1853	Dr. Waller	. . . .	. .	fib. tumor	"	saved	Med. Times and Gazette, vol. xxvii. p. 266.
35	1854	Dr. Simpson	. . . .	. .	moll. ossium	"	dead	Brit. Med. Jour., 1854, p. 1066.
36	1856	Mr. Humphrey	. . . .	. .	"	"	"	Ibid., 1856, p. 779.
37	1856	Dr. Clay	. . . .	. .	tumor	"	"	
38	1858	Dr. Murphy	. . . .	. .	"	"	"	Dub. Jour., No. 6, 1859.
39	1858	Dr. R. Greenhalgh	. . . .	. .	distortion	"	saved	Med. Times and Gaz., May, 1858.
40	. .	Drs. Douglass and Vanvalsah .	. . . .	. .	"	"	dead	Amer. Med. Journal.
41	1826	Dr. Crichton	. . . .	6 days	"	"	saved	Ed. Jour., July, 1828, p. 58.
42	1829	Dr. M'Kibbin, Belfast	. . . .	. .	exostosis	"	dead	Ibid., Nov. 1831, p. 352.
43	. .	Mr. Ward	. . . .	. .	. . . .	"	"	Lancet, Mar. 28, 1840.
44	1834	Dr. Montgomery, Dublin . . .	. . . .	. .	fib. tumor	"	"	Dub. Jour., vol. vi. p. 418.
45	1841	Mr. Ross, Invergordon	. . . .	5 days	tumor	"	alive	Ed. Monthly Jour., 1842.
46	1843	Dr. Elliott, Waterford	. . . .	. .	distortion	"	dead	Letter to the Author.
47	. .	Mr. Whitehead, Manchester . .	. . . .	. .	. . . .	doubt'l	alive	Ranking, vol. vii. p. 380.
48	. .	Mr. Braid	. . . .	. .	. . . .	dead	dead	
49	. .	Messrs. Bailey and Hardy . . .	. . . .	. .	. . . .	"	"	
50	1845	Mr. Lyon, Glasgow	. . . .	. .	tumor	"	saved	Ed. Monthly Jour., Dec. 1845.
51	1847	Mr. Skey, London	. . . .	. .	distortion	died	dead	Ranking, vol. v. p. 293.
52	1849	Mr. Campbell, Disburn	. . . .	. .	"	"	saved	Ibid., vol. x. p. 330.
53	1850	Mr. Nimmo, Dundee	. . . .	17 hours	"	"	"	Ed. Monthly Jour., Sept. 1850.
54	1848	Dr. Shipman, U. S.	. . . .	48 hours	tumor	"	dead	Amer. Med. Jour., July, 1849.
55	1848	Dr. Sannerman	. . . .	12 hours	distortion	"	"	Lancet, July 13, 1850.
56	. .	Dr. West, London	E. Williams .	14 hours	"	"	saved	Med. Times, Feb. 22, 1851.
57	1850	Dr. Oldham, London	. . . .	17 hours	"	"	dead	Ibid.

II. SUCCESSFUL CASES.

No.	Date.	Operator, or Authority.	Patient's Name.	Hours in Labor.	Cause.	Results to Mother.	Results to Child.	References.
1	1739	Mary Dunally, Midwife	Alice O'Neal	12 days	. . . .	rec.	dead	Ed. Medical Essays, vol. v. part 1, p. 439.
2	1793	Mr. Barlow	Jane Foster	5 days	distortion	"	"	Med. Rec. and Res., p. 154.
3	1822	Mr. Cellen, New York	. . . .	. .	"	"	saved	New York Journal, March, 1823.
4	1827	Dr. Richmond, Ohio, Amer.	. . . .	. .	. . . .	"	"	Western Medical Journal, November, 1827.
5	1827	Mr. Knowles, Manchester	. . . .	. .	. . . .	"	. .	Trans. of Prov. Ass., vol. iv.
6	1833	Mr. Greaves, Rockingham	. . . .	. .	distortion	"	saved	Lancet, 1833–4, p. 148.
7	1835	Mr. Gibson, New York, Amer.	. . . .	. .	. . . .	"	"	American Journal of Medical Science, May, 1835.
8	1837	Ditto and Fox	. . . .	5 days	. . . .	"	"	
9	. .	Dr. Fox	. . . .	. .	. . . .	"	"	Lancet, March 28, 1840.
10	. .	Dr. Wright	. . . .	. .	. . . .	"	"	Ibid., 1833–4, p. 148.
11	1845	Mr. Goodman, Manchester	Mrs. Sankey	5 days	. . . .	"	"	Ranking, vol. vii. p. 239.
12	1847	Dr. Henderson, U. S.	. . . .	. .	. . . .	"	putrid	Ibid., vol. v. p. 293.
13	1849	Dr. Radford	Mrs. Haigh	3 days	. . . .	"	saved	Prov. Medical and Surgical Journal, August 22, 1849.
14	. .	"	. . . .	. .	. . . .	"	"	Ranking. vol. x. p. 212.
15	1850	Dr. Coltman	. . . .	. .	exostosis	"	"	N Orleans Medical and Surgical Journal, November, 1850.
16	1841	Dr. Travis, Tenn.	. . . .	. .	. . . .	"	"	Med. Exam., September, 1850.
17	. .	Dr. Jeter, Georgia	. . . .	. .	. . . .	"	dead	Southern Medical and Surgical Journal, March, 85 .
18	1856	Dr. Thornton, Dewsbury	Anne N— .	. .	dis. of sacrum	"	"	Lancet, March 28, 1857.
19	1858	Mr. James Hawkins	Mat. Tanner	2 days	distortion	"	saved	Medical Times and Gazette, May 8th, 1858.
20	1851	Dr. Oldham	. . . .	. .	scirrhus	"	"	Lancet, vol. ii. p. 226, 1851.
21	1845	Dr. Brodie Heron	. . . .	. .	. . . .	"	dead	Amer. Jour. N. S., vol. xii. p. 886.
22	1851	Dr. W. H. Merriman	. . . .	. .	. . . .	"	. .	Ibid., vol. xxxi. p. 567.
23	1851	"	same patient	. .	. . . .	"	. .	Ibid.

Thus in British and American practice, out of 79 cases, 23 mothers were saved and 56 lost, or more than two-thirds.

Out of 77 cases where the result to the child is mentioned, 44 were saved and 33 lost, or nearly one-half.

In addition, I have collected from foreign authorities 371 cases, out of which 217 mothers recovered and 154 died, or about 1 in 2⅓.[1] Out of 189 of these cases where the result to the child is given, 139 were saved and 50 lost, or nearly one-fourth. Taking the entire number, which amounts to 450, we find that 230 mothers were saved and 210 lost, or about 1 in 2; and that out of 315 children, 211 were saved and 104 lost, or about 1 in 3⅓. M. Figuiera collected 790 cases, of which 424, or nearly one-half, were fatal to the mothers.

In Nassau, Dr. Ricker says, that in 311,409 cases, there were 12 cases of Cæsarian section, 2 mothers and 7 children were saved.

As to the value of each case, that must depend upon the reporter. I have not felt it my duty to exclude any which are related upon definite authority—my endeavor throughout has been to ascertain that authority as far as possible, and to avoid repetitions. For so much I am responsible, and I trust I shall be found correct. It may, however, be objected to this catalogue of operations, that many of the cases occurred in the "dark ages" of midwifery and may perhaps have been exaggerated or invented. Suppose that we admit this, and only take those which have occurred since 1750, this calculation gives 321 operations, from which 149 mothers recovered, or more than one-half, and by which 130 children were saved, and 57 lost, in 182 cases where the result is mentioned.

Dr. West has collected 409 cases, of which 251 (considerably more than one-half) proved fatal to the mothers, 237 children were saved.

Dr. Arneth mentions that Kayser has collected and analyzed 338 cases, of which number 210, more than half, proved fatal to the mother; 86 of the children were either dead born or perished soon after birth.

585. Further: on a good number of these patients the operation has been performed more than once; on some, three and four times. And if we credit the older writers we find five, six, and seven times with success.

This is shown in the following table:—

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[1] I do not mean that so many mothers were saved from death by the operation, but that they were saved from the effects of the operation. No doubt, many were really saved from death, which could not have been otherwise avoided; but we have proof that many could have been delivered by other means, inasmuch as they afterwards bore children naturally.

In 11 cases recorded in foreign journals since my tables were constructed, I find that six mothers were saved and five lost; eight children were saved and three lost.

No.	Date.	Operator or Authority.	Patient or Place.	No. of Operations.	No. of Children saved.	Result to Mothers.
1	. .	—Guillet	. . .	6 times	6	saved.
2	. .	Le Noir and Lebrun	. . .	3 times	3	recovered.
3	. .	M. Jobert	. . .	twice	1	"
4	. .	M. Peyronnie	. . .	"	. .	"
5	. .	M. Sommius	his own wife	7 times	. .	"
6	. .	A Surgeon at Paris	his own wife	5 times	. .	"
7	. .	. . .	. . .	3 times	. .	"
8	. .	. . .	At Aucois	6 times	. .	"
9	. .	Count Nessan	. . .	7 times	. .	"
10	1775-9	M. Lambron	. . .	twice	. .	"
11 12 13	1797 1801 1805	Mangold and L. Mautz	. . .	3 times	. .	recovered twice—died after 3d.
14	1797 1806	M. Bacqua	—Gabery	twice	. .	recovered.
15 16	1796 1810	Rhode and Sommer	. . .	"	. .	"
17 18	1802 1805	Lorinzer	Groger	"	. .	"
19	1805 7–14	M. le Maistre d'Aix	—Fauve	3 times	. .	do. died after 3d.
20	1813, '15	Dr. Charmeil	. . .	twice	. .	recovered.
21	1817 1819	M. Locher	. . .	"	. .	recovered once—died 2d time.
22	1821, '26	M. Merrin	—Viandes	"	. .	recovered.
23	1823	M. Bosch	. . .	"	. .	"
24	1823, '25	M. Schenck	. . .	"	. .	"
25	1805, '07	M. Dariste	Martinique	"	. .	"
26	1826, 30,32 39	M. Michaelis	—Adawetz	4 times	. .	"
27	. .	Dr. Zwancke	. . .	. .	. .	. . .
28	. .	Weidemann, Michaelis	. . .	4 times	. .	recovered.
29	"	"	. . .	. .	. .	. . .
30	. .	Dr. Boowin	. . .	twice	. .	recovered.
31	. .	M. Gardey	. . .	"	. .	"
32	1825 1826	Dr. Schmidt	. . .	"	. .	recovered once—died 2d time.
33	1824 1826	Dr. Engletrum	Amsterdam	"	2 saved	recovered once—died 2d time.
34	1833, '35	Dr. Bouvin	. . .	"	. .	recovered.
35	1832, '38	Dr. Kilian	. . .	"	. .	"
36	1837 1843	"	. . .	"	. .	"
37	1840 1844	Dr. Mestenhausen	. . .	"	. .	"
38	1846	Drs. Bach and Stolz	. . .	"	. .	"
39	. .	Dr. Wieckel	. . .	thrice	. .	"

M. Stolz has also published a case in which he performed the operation twice with success.[1]

[Professor Stolz, of Strasburg, has reported not merely one, but *six* cases, in which he has performed the Cæsarean section. In four of these cases both mother and child were saved by the operation, but in the other two the child only.]

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[1] Med. Circular, Aug. 22, 1855, p. 89; Ed. Med. Journal, Aug. 1855, p. 179.

Dr. Simpson mentions that, when he visited Bonn, he saw a woman upon whom Kilian had operated three times successfully, and who was looking forward to a fourth operation,[1] which my friend, Professor Retzius, of Stockholm, informs me has since been successfully performed.

[Professor Gibson, formerly of Philadelphia, operated twice on the same patient, and both times successfully for mother and child.[2]]

Dr. Decoene has recently performed hysterotomy in a case of ruptured uterus, for the purpose of removing the children (there were twins) from a woman on whom he had formerly performed Cæsarian section. She recovered the more recent as well as the former operation.[3]

586. After a careful examination of the cases on record, it appears that a certain amount of success has attended the operation, and that modern improvements have rather increased the number of recoveries; so that I think we may fairly conclude, that as so many women have recovered from the operation, *it does afford a chance to both mother and child, and that therefore we may be justified in having recourse to it; but that, as the danger is much greater than from any other operation, we should not be warranted in performing it, if there were a prospect of success by other means.*

This, then, constitutes the sole *advantage* of the operation, that in *cases where we cannot deliver the patient with safety by any other means, and when, consequently, both mother and child would inevitably die, we may afford each a chance by performing the Cæsarian section.*

It has no *comparative* advantages, being itself the ultimate standard by which the other operations are to be estimated, and which are valuable, inasmuch as they afford a means of escape from this more formidable one. In this point of view I must not omit noticing one which, although not available in any case to which we are called at the time of labor, may prevent the necessity of a second operation. I allude to the artificial induction of premature labor, or of abortion. Whenever the diameters of the pelvis are so reduced as to render the extraction of a mutilated fœtus impossible, or even hazardous, I conceive that it would be grievous neglect of duty not to propose this alternative; nay, more, I really think we have a right to insist upon it; for surely, it can hardly be expected that a conscientious medical man will consent to destroy child after child, or to subject mother and child to the fearful risk of the Cæsarian section, when a means of avoiding it is in his power. It is true that by this operation the child may be lost, but the mother will, in all probability, be saved; and the bare chance of saving the child by Cæsarian section, can never compensate for the additional risk to the mother.

[It is very certain that nothing can justify a resort to the Cæsarian section in any case in which there is a fair prospect of the labor being terminated with safety to the mother, either by the unaided powers of the uterus, or by instrumental assistance. Formidable as the operation must be viewed under all circumstances, modern statistics have shown us, nevertheless, that when it is resorted to early in labor, it is attended with less danger than was formerly ascribed to it, and that it affords a chance in a considerable number of cases, for the escape of both mother and child from the almost certain death which must happen to both if it were omitted.]

587. The *disadvantages* of the operation will be easily gathered from what has been said; they are mainly, the great risk of hemorrhage or of

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[1] Edin. Monthly Journ., July, 1850.

[2] [Amer. Journ. Med. Sciences, May, 1838.]

[3] Med. Times and Gaz., May 21st, 1858, p. 680.

fatal peritonitis to the mother, and the small chance afforded to the child; these constitute the *objections* to the operation.

That these are very serious objections cannot be denied, nor that they would be insurmountable, had we any other mode of delivery. But when we consider that the only choice is between this operation, which does afford some chance, and certain death to both mother and child, we cannot, I think, hesitate about running the risk. Doubtless, however, the dangers of the operation should make us pause, and carefully examine the facts of the case, with the aid of the experience of others, before we decide upon this proceeding. In the present day it would be an indelible disgrace to an accoucheur, that his patient, after recovering from the Cæsarian operation, should bear children without assistance.

[We are informed by M. Castel, that in a case which occurred in one of the French hospitals, the Cæsarian section being determined on, some delay took place in accommodating with seats the crowd of students who had assembled to witness the operation: during the time thus occupied the female was delivered naturally. M. Gomelle states that at the hospital of M. Dubois, a small woman, who had five times submitted to the Cæsarian section, was delivered naturally the sixth time.]

588. The *cases suitable for the operation* are not very numerous.

1. When the pelvis is so distorted from any cause that the diameter of the upper or lower outlet is reduced to an inch and a half or two inches, it may be considered impossible to extract a mutilated fœtus; or, if possible, it must be with so much force as to entail the death of the mother. The operation is equally necessary under these circumstances, whether the child be alive or dead, and it may also be required (in consequence of mollities ossium) after several children have been born naturally.

2. Morbid growths from the periosteum, which offer a fixed and permanent and increasing obstacle, may so much reduce the calibre of the passage as to render this operation necessary. This was the case with the patients of Dr. Montgomery and Dr. Shekleton. But before we decide upon the necessity for this mode of delivery, we must be quite sure that the obstacle can neither be displaced nor reduced in volume; and this can seldom be determined until labor commences. On the other hand, we must remember that all tumors increase, *however slowly*, and that, therefore, the patient having been delivered "*per vias naturales*" in one labor, is no proof that she may be in the next.

3. In some cases of ruptured uterus, when delivery is imperative, but impossible "*per vias naturales,*" Cæsarian section has been recommended. It appears to me that the additional risk from the operation renders its propriety very questionable.

4. The operation has been performed successfully in cases of extra-uterine fœtation, where the continued presence of the fœtus in the abdominal cavity threatened the mother's life.

5. In case of the sudden death of the mother, the Cæsarian section may be performed for the purpose of saving the infant. Successful cases are on record; and one recently by Mr. Harlay, in Edinburgh.[1] Of course the operation will be useless, unless the woman have arrived at that period of pregnancy when the child is "viable." It will also be in vain if much time have elapsed after the death of the mother. Dr. Jackson, however, recovered an infant half an hour after the death of the mother.

6. If, towards the end of pregnancy, the uterus be wounded extensively, Dr. Hull considers the Cæsarian section necessary.

7. Authors have mentioned other cases to which the operation was appli-

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[1] Edin. Monthly Journal, July, 1850.

cable, as in occlusion to the vagina, scirrhus uteri, etc. But these hardly appear to be adequate grounds for so serious an operation.

589. The best *period for the performance* of the operation appears to be at the commencement of the labor, provided there be no doubt of its necessity. The strength of the woman is then unimpaired, and she can not only support the operation better, but has greater prospect of escaping subsequent inflammation. It is supposed, and I think not without foundation, that the ill success which has attended the operation in this country is partly owing to the late period at which it has been undertaken.

In Mr. Thompson's case, it was performed 24 hours after the commencement of labor; in Dr. Cooper's, 12 hours; in Mr. Chambers' case the labor had lasted 12 days; in Dr. Hamilton's, more than 2 days; in Mr. King's, more than 3 days; in Mr. Atkinson's, nearly 3 days; in one of Dr. Hull's (Isabel Redman), 12 hours; in the other (Ann Lee), 10 days; in the case of Mary Donally, 12 days; in Mr. Barlow's case, 5 days. Dr. Hull proposes to operate as soon as the os uteri is dilated, and before the membranes burst. De Graafe advises the operation to be performed just after the rupture of the membranes, and the commencement of the expulsive pain.

590. METHOD OF OPERATING.—Having determined upon the necessity, and the proper period for the operation, the next subject for consideration is the best mode of performing it. Very little alteration has taken place in this respect since the earlier writers.

The bowels and bladder are to be evacuated, and the patient placed on her back, upon a table covered by a mattress. Her fortitude must decide upon the necessity for restraint, and its amount, if chloroform be not used.

Before commencing the operation it will be proper to ascertain (by the stethoscope) the situation of the placenta, or, at least, that it be not in front. The incision through the integuments must then be made, either vertically, through the linea alba — obliquely, on the outside of the rectus muscle — between that muscle and the spine — or horizontally, beneath the umbilicus. The latter is the best if the patient be deformed. It should be about eight or ten inches in length, and when vertical, it may be commenced a little above the umbilicus, and terminate near the pubes. This incision should divide the parietes of the abdomen down to the peritoneum, which is then to be cautiously punctured, and a director, or the finger, inserted into the wound, so as to avoid injuring the intestines, and the peritoneum divided. The uterus will now be exposed, and an incision must be made into, but not through its parietes, of the same length as that through the abdominal parietes. This incision must be cautiously deepened, until the membranes are exposed. A slight opening must then be made in them, and some of the liquor amnii removed, by small pieces of sponge. It has occurred to me that this might most readily be effected by a syringe. The object in view is to prevent effusion into the abdominal cavity. By Lauverjat and others we are recommended to rupture the membranes previously. The opening is then to be enlarged, and the infant withdrawn, the funis tied, and the placenta and membranes removed.

The remaining liquor amnii, with any blood which may have escaped, must be removed from the cavity of the uterus, and the operator should make sure that the os uteri is pervious for the escape of the lochia. No sutures are required in the uterus: as it contracts, the wound will be reduced to about 1½ to 2 inches in length, and the lips will come into apposition, if it be healthy. It is only in cases where they do not do so, that there is anything to fear from hemorrhage. When the uterus is diseased, the wound does not close perfectly, and of course, union cannot take place.

The abdominal cavity is next to be lightly sponged, to remove any blood which may have escaped, and then, the intestines being retained "*in situ*" by an assistant, the lips of the external wound are to be closed by so many sutures of silver or iron wire as may be necessary. Dr. Monro, of Edinburgh, advised "that in performing the Cæsarian operation, we should be careful that the viscera be exposed as little as possible; and that the sides of the wound should be kept contiguous by a greater number of stitches than are commonly employed in wounds, in order to exclude the air from the cavity of the abdomen." In addition to the sutures, straps of adhesive plaster may be applied, and over all I would suggest Dr. Macartney's water dressing. The patient must then be placed in bed, and the utmost quiet observed. Stimulants will probably be necessary during and after the operation; and when the patient is settled in bed, an opiate may be given.

As a variation from this mode of operating, I may mention Dr. Aitken's suggestion of performing it "while the parts are immersed in tepid water, so as to exclude the air," and so, perhaps, diminish its fatal effects. I do not know that this plan has ever been tried.

M. Roubaix, in an elaborate essay on this subject, lays down the following objects at which we are to aim in performing the operation: 1, to prevent the entrance of air into the peritoneal cavity and uterine sinuses; 2, to prevent the effusion of blood and liquor amnii; 3, to make the incisions in such a manner that union by first intention may be encouraged as far as possible; 4, to take precaution against inflammation of neighboring tissues; 5, to perform the operation at a favorable time.[1]

591. The *difficulties* of the operation are not great. With a little care, we may avoid that part of the uterus to which the placenta is attached, and which is the most vascular, as the stethoscope, previously applied, will indicate whether it is situated anteriorly or not. Caution will also avoid wounding the child when dividing the uterus.

In approximating the lips of the external wound, the intestines are sometimes troublesome, and it is of importance not to include any of them, as that would add the dangers of strangulated hernia to the unavoidable risk of the operation.

The principal *dangers* of the operation are—

1. Hemorrhage, from the incomplete closure of the wound in the uterus.
2. Strangulation of a loop of the intestines, either in the wound of the uterus, or in the external wound, although due attention will avoid this danger altogether.
3. Subsequent inflammation of the uterus and peritoneum.

The patient may die of the shock within a few hours, or her strength may be exhausted by hemorrhage into the abdominal cavity; but if she survive for a day or two, her death will then probably be owing to inflammation.

592. *Subsequent treatment.*—The most incessant care and attention will be required. The water-dressing should be continued, and it may be as well to administer small doses of calomel and opium. On the first appearance of inflammation at the edges of the wound, leeches should be applied along it, and if there be tenderness, a considerable number should be applied over the abdomen, and repeated if necessary, and the doses of calomel and opium increased.

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[1] Prov. Med. and Surg. Journ., Oct. 30th, 1850, from Encyclographie for June, 1850.

CHAPTER XV.

OBSTETRIC OPERATIONS.—7. SYMPHYSEOTOMY.

593. But one more operation remains for consideration, and I should have omitted it altogether, had I not felt it as much a duty to point out its inapplicability, as the suitability of the others to the cases for which they were intended. I do not for a moment wish to undervalue the humanity which desired to substitute a minor operation for one so formidable as the Cæsarian section. But when the results of experience support the opinion of the wisest and best midwifery authors, it would be a criminal neglect did I not adduce the objections to this operation in their strongest form.

First, however, it may be interesting to give a sketch of its history.

M. Sigault, while yet a student, being impressed with the fatal results of the Cæsarian section, conceived that it might be altogether avoided by an artificial separation of the ossa pubis. This notion was based upon the assumed fact, that this joint spontaneously separates in difficult labors. This had been asserted over and over again by the older writers, and upon this assumption Sigault based his experiments upon the dead body. In the year 1768, he presented a memoir to the Faculté de Médécine on the subject, proposing that the operation should be tried at first upon animals, and then upon condemned criminals. The memoir was referred to M. Ruffel, who reported unfavorably, and the subject was dropped. However, M. Sigault was not discouraged: he again proposed it in his Thesis, on taking his degree at Angers, and in Paris, on seeking for his license; and as the proposal was communicated to others, and favorably received, it excited a good deal of interest.

In M. Alphonse Le Roi, Sigault met with an able second, and they determined to give the operation a fair trial the first opportunity. This occurred on the 1st October, 1777, in the case of —— Souchel, who had previously been delivered by craniotomy. She was safely delivered by the new operation, and a report was immediately made to the Faculté de Médécine, who were requested to appoint a commission to superintend the patient's recovery. MM. Grandclas and Descemet were appointed to this office, and notwithstanding that the bladder was injured, and the mother barely escaped with life, such was the enthusiasm excited in the Faculté de Médécine by their report, that they lost sight of the calm investigation becoming a learned body, and on the strength of one case — and that not a very satisfactory one — voted medals to MM. Sigault and Le Roi, and procured a pension for the former and for his patient.

The inscription upon the medal was:—

A. 1768. Sectionem Symphyseos Ossium
Pubis. Invenit. Proposuit.
A. 1777.
Fecit feliciter
M. Sigault, D.M.P.
Juvat M. Alphonsus Le Roi, D.M.P.

Persons were not wanting to applaud the inventor and his operation, which was characterized as "the result of inspiration," and several practitioners in France and Germany followed his example.

M. Sigault himself operated on four other women, one of whom died, and several of the children. He seems, indeed, to have become less confident in its safety and efficacy; for he refused to perform it unless there was a space of 2½ inches in the short diameter; and before his death, in such a case, he recommended the Cæsarian section. "It was soon found, however, not to merit the high encomiums bestowed upon it. *Every operation was found to have its victim,* although it was several times performed upon women, whose pelves were either not at all, or very slightly deformed, and who, either before or after the operation, were delivered without any extraordinary assistance—a convincing proof that the operation had been, in these cases at least, unnecessarily resorted to."[1]

In 1778, he published a "Discours sur les Avantages de la Section du Symphyse du Pubis," in which he examines the usual means of assisting difficult labors, and concludes by stating his reasons for preferring Symphyseotomy to the Cæsarian section.

The first persons, I believe, who investigated the propriety and efficacy of the new operation in this country, were Dr. W. Hunter, Mr. Hunter, and Dr. Denman. The former published the result of his inquiries in the *London Med. Obs. and Enquiries.* "The women of Great Britain," says Dr. Osborn, "are therefore under considerable obligations to the late Dr. Wm. Hunter, who, from an accurate mensuration of those pelves where the Cæsarian operation had actually been performed in this country, and of others still smaller, preserved in his museum, has demonstrated the futility of the section of the symphysis as a succedaneum for that operation, or as a certain means of preserving both the mother and child." He suggested a combination of the Sigaultian operation with craniotomy, as affording the mother a better chance than the Cæsarian section. But, as Dr. Osborn remarks, "Prof. Guerard's case is exactly in point, and confirms by experiment what was to be expected *à priori.* The child's head in that case was opened, after the division of the symphysis had been performed; but the professor was, notwithstanding, foiled in every attempt to deliver, both by the forceps and the crotchet; and the event in the end proved fatal to the mother."[2]

The next writer who notices the operation is Dr. Leake, who, in his work on the Diseases of Women, 1781, has a few pages upon this operation, of which he is inclined to judge favorably, though with caution. He answers some of the objections urged against it, but admits that more experience was required.

The operation was performed in the year 1782, for the first and last time in this kingdom, by Mr. Welchman, of Kington, in Warwickshire. The child was putrid, and the mother died; but Mr. Welchman thinks that her death was not caused by the operation.[3]

Dr. Osborn, in his Essays on Midwifery, 1783, gives a good historical sketch of the operation, and after a very careful examination into the merits of it, he arrives at the conclusion that "*no circumstances whatever, real or imaginary,* can ever render it a warrantable operation."

Mr. Dease, in his Observations in Midwifery, 1783, disapproves of the operation. He says, it was "of worse consequence than the Cæsarian; as it subjected the woman to all the dangers of the latter, without the same advantages of saving the child."

Dr. Hamilton, Sr., in his Outlines of the Theory and Practice of Midwifery, 1784, doubts the efficacy of the operation, and points out its hazard.

Dr. Aitken, Elements of Midwifery, 1784, says that the operation may be useful "when about half an inch of addition to the short diameter (of the pelvis) is sufficient to allow delivery."

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[1] Hull's Second Letter, p. 94.

[2] Essays on Midwifery, pp. 282, 323.

[3] London Med. Journal, 1790. Hull's First Letter, p. 138.

Dr. Hull, in his First Letter, 1790, points out the inadequacy of the operation; and in his Second Letter enters more fully into the history of it, and shows that the combination of symphyseotomy with craniotomy (first proposed by Dr. Hunter, and repeated by Mr. Simmons) is worse than the Cæsarian section.

Dr. Denman, in his Introduction to Midwifery, objects to the operation, except, perhaps, in a case where the life of the child (it being alive) was of such immense importance to the nation, that the mother might fairly run the risk.

By every modern British writer the operation is denounced, and is not likely ever to be again attempted in this country.

The contagion of enthusiasm spread rapidly among the French, though some more cautious and philosophical writers held aloof, and others decidedly disapproved of the new operation. It has not, however, even in more modern times, been so completely discouraged as we might have expected from the results of the cases in which it has been employed. The last case performed in France was by M. Masleur, at Lagemont; the space gained admitted one finger between the divided symphysis; and the necessity for the operation may be judged by the fact that, after recovery, the patient bore a living child naturally!

The operation has been performed in Italy. It has also been modified by Prof. Catolica, after the suggestion of Desgranges and Champion. Instead of dividing the symphysis, the ossa pubis were cut through, nearer their junction with the ossa ilia, and by this means a positive increase in the antero-posterior diameter was gained. M. Galbiati performed this operation in 1819, and it proved fatal.

In Germany, it was at first highly extolled; but the general opinion afterwards was unfavorable to its utility. Indeed, it would be astonishing to find any candid man who could resist the evidence afforded by the cases in which it has been tried.

594. STATISTICS. — 49 cases have been recorded: of these 16 mothers died, or about 1 in 3 out of 40 cases; the child was born alive in 11, and dead in 19, or 1 in 2.

I shall not give these cases in detail, but a slight analysis may show more fully the slight ground the advocates of the operation had for exultation.

1. It was performed unnecessarily in four cases, as was proved by a subsequent natural delivery.

2. Without any cause in one case, the patient having borne children naturally, and there being no deformity; and in another, where there was sufficient space.

3. Without the possibility of benefit from it in one case, where the antero-posterior diameter was only 1¾ inch.

4. Although 33 mothers recovered, 10 children were lost, 14 saved, and 1 much injured. Of 7 nothing is stated. Of the 16 mothers who were lost, 5 of their children only were saved; 9 were dead, 1 much injured, and of 1 nothing is stated. So that,

5. In the latter case, 16 mothers were sacrificed to save 5 children.

6. Again, although 33 mothers recovered, yet to save 14 children they paid very dearly — for 1 had the bladder and urethra injured; 2 had incontinence of urine; 3 had prolapsus uteri. In one, the bones of the pelvis exfoliated, the cervix uteri and posterior part of bladder were gangrenous; and several were endangered by the operation, whilst of a great number no details are given.

We shall now examine the merits of the operation a little more minutely.

595. The *object of the operation* is to increase the short diameter of the pelvis, by the enlargement of the arch formed by the ossa ilia and pubis, so

as to allow of the passage of the child in cases where it must otherwise have been extracted through an artificial opening: and by this means afford a greater chance of life both to the mother and child.

596. The *nature of the aid* afforded is easily comprehended, though the amount is altogether overrated by the early advocates of the operation. The cartilage of the symphysis pubis being divided, the pressure of the head, or the assistance of the operator, may separate the ossa pubis, at the expense of some of the sacro-iliac ligaments: for the separation of the ossa pubis will be *exactly in proportion to the yielding of the sacro-iliac synchondrosis*; so that, if the latter were anchylosed, the operation would fail altogether.

Again, it must be remembered, that owing to the posterior situation of the sacro-iliac synchondrosis, the space gained will be *mainly in the oblique diameter of the pelvis; next to this in the transverse, and least of all in the antero-posterior diameter.* But it is from the *last-mentioned diameter* being too short that the difficulty exists, and therefore *upon the amount gained in it*, depends the successful issue of the operation.

The entire question turns upon this point. *If by the separation of the ossa pubis so much space be gained as will make up the difference between the sacro-pubic diameter in a deformed pelvis, and the same diameter in an ordinary one, then the operation is, at least mechanically, adapted to the object in view.*

Hence it is very important to ascertain as nearly as we can, how much may thus be added to the antero-posterior diameter. We know from Sigault and Le Roi's case, that the ossa pubis may be separated four inches: how much will this increase the short diameter? Dr. Bentley, in his Dissertation, quotes the experiments of Ripping of Paris, and Lobstein of Strasbourg, in support of the conclusion that the utmost gain by the operation is *four lines* in the short diameter, and Dr. Aitkin says *half an inch*.

I feel satisfied myself that *half an inch* is the very utmost that can be gained, except by such violence as would be utterly unjustifiable. But then Dr. Leake observes that the head will press into the opening, and "it will therefore follow that as much of the occiput, or hind head, as is intruded into an aperture at the pubis of two inches and a half, so much precisely will be the space gained by this operation, and superadded to the short axis of the pelvis from sacrum to pubis, which will be equal to the enlargement from side to side — the circumstances here contended for." This is undoubtedly ingenious, but not quite correct, inasmuch as the long diameter of the head at the upper outlet corresponds with *one of the oblique*, and *not with the sacro-pubic diameter;* so that the occiput would correspond pretty nearly with the acetabulum, and the tuber parietale with the interval between the ossa pubis. In this situation, no part of the head could pass through the opening unless the operator changed its position. Further, Dr. Osborn has justly remarked, that this pressing into the opening would be at the expense of so much injury to the bladder and soft parts as would render the operation unjustifiable.

597. The *advantages* of the operation, as enumerated by its supporters, are:

1. That it substitutes an operation of less danger for the Cæsarian section; but this, we have seen, is not true, for although one in three of the mothers only are lost by it (rather less than by the Cæsarian section), yet those who recover are liable to accidents which fully counterbalance this slight advantage.

2. That it affords a better chance of saving the child; but we have seen that only one-half of the children were saved, whilst by the Cæsarian section, more than two-thirds were preserved.

3. That it is a less painful operation. This is true as regards the period of operating, but if the period of convalescence be included, with the sequelæ which occasionally occur with each, I should doubt the fact.

4. The section of the pubis which allows the child to be born by the natural passage, carries not with it those ideas of cruelty which the Cæsarian operation does, where the patient is, as it were, embowelled alive. This is very plausible but very false humanity.

598. The *objections* against the operation are to my mind unanswerable, although some that have been put forward as such have been refuted by experience. It must be remembered that the operation is contemplated for those cases in which the Cæsarian section would otherwise be necessary.

1. For these cases the operation is inadequate. In a former chapter, we have seen that the Cæsarian operation ought not to be performed in any case where the antero-posterior diameter is more than two inches, inasmuch as the delivery can be accomplished by a less hazardous method. Now, as the Sigaultian operation adds but half an inch (at the utmost), this would increase the antero-posterior diameter to 2½ inches. But it has been ascertained that a living child cannot pass through a pelvis whose short diameter is less than 3 inches; consequently, the Sigaultian section cannot avail in these cases, unless craniotomy be superadded. But the mortality of the two would be greater than that of the Cæsarian section, for 1 in 3 of the mothers would be lost, and all the children, by the combined operations; whereas by the latter, although 1 in 2¼ of the mothers are lost, more than two-thirds of the children are saved.

2. Even if the space gained would secure the delivery, the mortality of mothers and children would not justify its preference to the Cæsarian section —especially if we take into account the sequelæ. These objections appear to me quite conclusive against the operation; but as others have been adduced, it may be as well to enumerate them.

3. The cartilage of the symphysis may be ossified; which will render the operation impracticable, even after it has been commenced.

4. Great injury may be inflicted by the knife on the bladder or soft parts within the pelvis.

5. Equal injury may happen from the violence used in separating the ossa pubis.

6. The soft parts may be injured by pressure against the edges of the divided ossa pubis.

7. The sacro-iliac synchondrosis may be ruptured past remedy.

8. The divided cartilages may not unite. Experience, however, has shown the groundlessness of this objection.

9. The admission of external air may excite inflammation.

These latter objections have, of course, a certain weight, but hardly sufficient to prohibit the operation, if it were adapted to the cases for which it has been proposed.

But there is another class of cases for which it would seem at first sight more suitable, and which, indeed, appear to have been contemplated by those who recommend its performance, where the antero-posterior diameter of the upper outlet is three inches. I mean those cases where the difficulty is too great for the forceps, and in which, as we have seen, craniotomy is necessary. Here the gain of half an inch might enable a living child to pass. But the operation is objectionable in these cases, because of the results; for independent of the ill consequences to those who recover, we find that one in three of the mothers die, and only half of the children are saved; whilst, although all the children are sacrificed by craniotomy, only one in five of the mothers die. And it must also be borne in mind, that these results of craniotomy have occurred under more unfavorable circumstances than those of the Sigaultian operation.

599. From these considerations, I trust that my readers will agree with me in the following conclusions:

1. That the Sigaultian operation is undeserving of the encomiums passed upon it, inasmuch as it offers no increased chance of safety to the mother or child—the statistics of the cases in which it has been tried having shown that one in three of the former, and one-half of the latter are lost; besides that in those of the mothers who recover, much inconvenience is experienced from the consequences of the operation.

2. That it is perfectly inadmissible as a substitute for the Cæsarian section, because the utmost space gained by it would not permit the child to be born alive in any case in which the Cæsarian operation *ought to be* contemplated; and if the child must, in addition, be destroyed, the combined mortality of the mothers and children would then be far greater than from the Cæsarian operation.

3. That it is equally inadmissible as a substitute for craniotomy alone, in cases where the forceps are inadequate, because the consequences to the mother are more serious from it than from craniotomy.

600. If, as I believe, these conclusions are correct, I need only add an account of the mode of performing the operation, not as a model, but to complete its history. Perhaps the best mode of doing this is to give the account of one of M. Sigault's cases, abridged by Dr. Osborn. "Mons. Sigault, with a common bistoury, cut through the integuments and linea alba, beginning the operation at the upper and central part of the symphysis pubis; then introducing his forefinger as a director, he cut through the ligaments and cartilage; immediately upon the completion of which, the two ossa pubis, with a peculiar noise, spontaneously separated two inches and a half; this was demonstratable, for M. Le Roi laid his four fingers into the opening. M. Sigault immediately introduced his hand into the uterus, broke the membranes, and brought down the feet. M. Le Roi accomplished the delivery. The whole operation, both section and delivery, was finished in five minutes. The child was born alive. A ligature was passed round the body of the mother, to keep the pelvis firm. The patient having no bad symptoms, was left till the next day, when every circumstance continued favorable; she had passed her urine voluntarily twice, there had been no hemorrhage, and she had suffered little pain."

Having entered thus fully upon the operations proposed for the relief of the previous classes of unnatural labor, we may now resume the consideration of the remaining deviations from natural labor.

CHAPTER XVI.

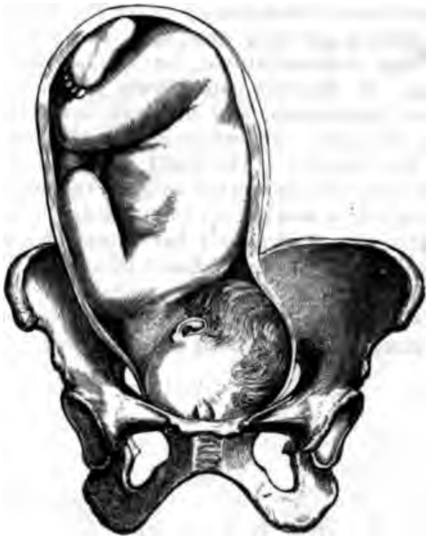
PARTURITION. CLASS II. UNNATURAL LABOR.

ORDER 5. MAL-POSITION AND MAL-PRESENTATION OF CHILD.

601. **We** have already investigated those cases of unnatural labor which arise from defective uterine power, and from an abnormal condition of the passages. The only class of deviations which remains, is that which is caused by some peculiarity on the part of the child. In these cases we assume that the uterine power is intact, and that there is no impediment in the passages. The difficulty is a purely mechanical one; but if it be not removed, after a certain time the constitution is involved and the characteristics which we noticed in powerless labor present themselves. Thus, as in the case of defective passages, that which at first was purely local and mechanical, involves at length the vital powers and the constitution of the patient.

We shall first notice certain mal-positions. 1. Face presentations, as they are called; and 2, those cases in which the forehead emerges under the arch of the pubis.

Fig. 155.



Face Presentation — First position.

502. Mal-positions. 1. Face Presentations. At first sight it may seem strange to call a "face presentation" a mal-position; but a moment's thought will show that when the face is planted across the upper outlet, it is merely because, from some cause, the head which presented has deviated from its usual mode of descent. Dr. F. Ramsbotham remarks, "I am inclined to think that most of the face presentations we meet with in practice, were originally brow presentations, and have been changed by the action

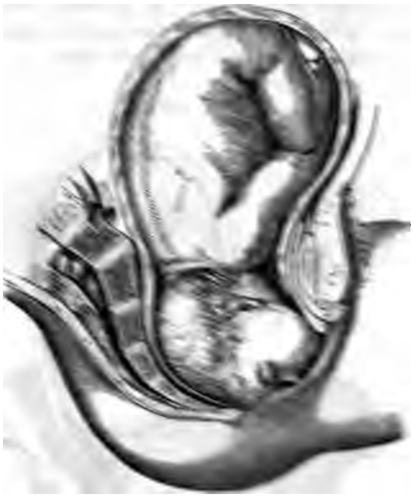
of the uterus in the way I have already specified." In face presentations the head is bent backwards, so as to place the face nearly flat across the brim of the pelvis in its oblique diameter.

603. **Mechanism.**—The face may present in two positions, according as the forehead is toward one or other os ilium. In the *first position*, the forehead is towards the left ilium, or rather the left acetabulum, and the chin towards the right ilium, or right sacro-iliac synchondrosis, the bridge of the nose representing the line described by the sagittal suture in the first cranial position (fig. 155). The right side of the face is anterior, and being anterior is more depressed than the other upon entering the brim, so that, on making an examination, the finger touches the right eye or the zygoma, and upon this part the primary tumor forms. M. Naegelè remarks that there forms "a swelling, first upon the upper part of the right half of the face, which in this species of face presentation (*first position*) is always situated lowest." If the progress of the head through the external passages be unusually rapid, this is the only tumefaction observed; "but if it advance slowly, and the head remain a long time in the cavity of the pelvis before it actually enters the vagina, the inferior half of the right side of the face, viz., part of the right cheek, will be remarked after birth as being the principal seat of the swelling."

The head, as we have said, enters the brim obliquely as to its diameter and plane, and thus descends into the cavity; when there, the chin makes a turn from right to left, and so emerges obliquely under the arch of the pubis (figs. 156, 157), whilst the vault of the cranium sweeps over the perineum.

This first position is by far the most frequent.

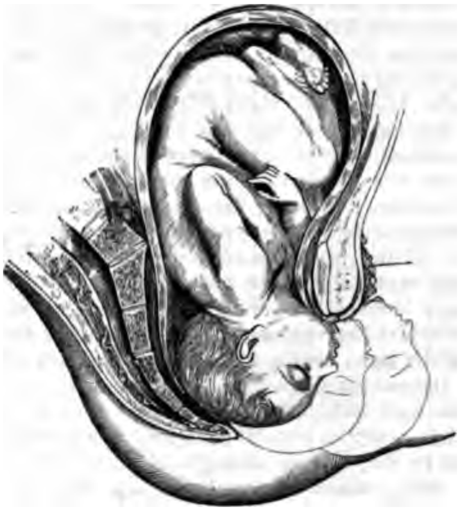
Fig. 156.



Face Presentation—First position.

The second position is the reverse of the first: the forehead is turned towards the right acetabulum, and the chin to the left sacro-iliac synchondrosis (fig. [illegible]). The primary tumor forms in the upper part of the left cheek, and the secondary (if there be two) on its lower part. The head enters [illegible] [illegible] obliquely, and so emerges from the pelvis; but the chin makes a quarter turn from left to right anteriorly, and when expelled is under the arch of the pubis, whilst the head sweeps over the pelvis.

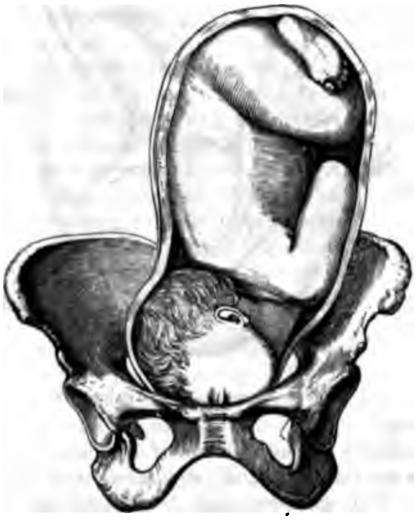
[Fig. 157.]



Passage of the Head through the external parts in Face Presentation.

The older writers describe the head as emerging from the lower outlet in face presentations, with the chin towards the perineum; and Dr. Smellie has given a plate in illustration of this. A moment's examination will show that this is mechanically impossible, and the careful observation of Naegelè and others has been unable to detect any such case.

Fig. 158.



Face Presentation — Second position.

604. STATISTICS.—*Frequency.*

a. British Practice.

Authors.	Total No. of Cases.	Face present.
Dr. Jos. Clarke	10,387	44
P.P.	8,847	7
Dr. Merriman	2,947	10
Dr. Granville	640	1
Dr. S. Cusack	701	8
Dr. Maunsell	889	7
Mr. Gregory	691	2
Dr. Thos. Beatty	1,184	4
Dr. Collins	16,414	83
Dr. Lever	4,666	24
Dr. Reid	5,691	25
Drs M'Clintock and Hardy	6,634	14
Dr. F. Ramsbotham	48,996	162
Dr. E. Murphy	467	7
Dr. Metcalf	300	1
Mr. Crosse	1,394	5
Mr. Earle	4,320	4
Birmingham H.	650	13
Mr. Rose	600	1
Mr. Bailey	2,819	15
Mr. Watson	800	14
Dr. Copeland	1,290	7
Dr. Bliss	771	8
Dr. Pagan	8,684	6
Mr. R. U. West	2,106	10
Mr. J. Thompson	3,300	6
Drs. Sinclair and Johnston	18,748	40
Dr. Hall Davis	7,283	110

b. *French Practice.*

Authors.	Total No. of Cases.	Face present.
Mad. Boivin	20,517	74
Mad. Lachapelle	15,652	65
M. Ramboux	491	3
M. Dubois	10,742	30
Dr. de Belli	2,789	17

c. *German Practice.*

Authors.	Total No. of Cases.	Face present.
MM. Moschner and Kursak	12,329	122
Dr. Carus	2,557	24
Dr. A. E. v. Siebold	1,003	10
Dr. E. C. v. Siebold	494	4
Dr. Kilian	9,392	122
Dr. Merrem	157	1
Dr. Naegelè	115	4
Dr. Klugè	799	6
Dr. Brunatti	100	2
Dr. Adelmann	57	1
Dr. Jansen	13,365	15
Dr. Arneth	6,608	40
Prof. Schwerer	21,804	50
Wurtzburg Hospital	637	10

Thus in British practice, out of 141,259 cases, there were 567 face presentations, or 1 in 249; among the French, 50,141 cases, and 189 face presentations, or about 1 in 265¼; and among the Germans, 69,417 cases, and 411 face presentations, or about 1 in 169½; the whole giving 1167 face presentations in 260,817 cases, or about 1 in 223½ cases.

As to the mode of delivery, and results to mothers and children, I cannot make out a regular table, but must content myself with such scattered notices as I have been able to obtain. Mr. Giffard relates 4 cases; 1 was delivered naturally, and 3 with the forceps; neither mother nor children were lost. Dr. Smellie gives 19 cases; 3 delivered naturally, 5 by version, 4 by the forceps, and 5 by craniotomy; 3 mothers and 11 children were lost. Mr. Perfect relates 8 cases: 1 delivered naturally, 2 by version, 4 by forceps, and 1 by craniotomy; none of the mothers, but 2 of the children were lost. Dr. Jos. Clarke performed craniotomy twice in his 44 cases: all the rest were delivered naturally. Dr. Ramsbotham has recorded 3 cases: 2 delivered by the forceps, and 1 by craniotomy; all the children were lost, but none of the mothers. Dr. Granville's single case was delivered by version. Dr. Cusack's 3 cases were delivered naturally; neither mother nor child was lost. Dr. Collins' 33 cases were all delivered naturally; the mothers were saved, and but 4 of the children lost, 1 of which was an acephalous fœtus. All Dr. Pagan's 6 cases were delivered naturally; all the mothers recovered, and 5 of the infants were saved. All Mr. Thompson's cases, mother and child, recovered.[1] Drs. Johnston and Sinclair lost 6 children, and 1 mother died of peritonitis.[2] Dr. Hall Davis lost 8 children.[3]

Of Madame Boivin's 74 cases, we are informed that 41 were delivered naturally, 14 by version, and 2 by craniotomy, but nothing is said of the mortality. Of Madame Lachapelle's 65 cases, 41 were delivered naturally, 20 by version, and 4 by the crotchet; 7 children are stated to have been lost.

Of 80 cases under the care of Dr. Boer, of Vienna, all but one were delivered without assistance; in that one case the forceps were used. None of the mothers suffered, and 3 or 4 of the children only were lost. Of Dr. A. E. v. Siebold's 10 cases, 6 were delivered by the forceps. Of the 40 cases related by Dr. Arneth, all were delivered by the natural powers; 3 boys and 2 girls were lost.[4]

Thus, so far as our data go, out of 384 cases, 248 were delivered naturally, and 77 required artificial assistance (*i.e.* 42 versions, 20 forceps, and 15 craniotomy). In 190 cases where the result to the mothers is given, 3 died, or 1 in 60; and of 256 children, 19 were lost, and 15 destroyed, or about 1 in 7.

It is worthy of remark, that the mortality among both mothers and children is greatest when assistance was given; for of Dr. Collins' 33, M. Boer's 80, and Dr. Arneth's 40 cases, delivered naturally, none of the mothers, and but 12 of the children were lost. These notices show also the change of opinion as to the necessity for assistance.

["I have treated," says Dr. Huston, in a note to a former edition, "seven cases of face presentation; four were delivered with the forceps, one with the vectis, and the others without assistance, the children being small. The mothers all recovered, but two of the children were still-born." We have seen nine cases of face presentation; four of them were delivered without assistance. In these cases the mother had a favorable recovery, and the children were born alive and did well; three were delivered with the vectis; the mothers all did well, one of the children was still-born, but recovered under the use of appropriate means, in the remaining two cases the application of the forceps was found to be necessary to accomplish delivery. In both the children were still-born; one was subsequently resuscitated, but the other perished.]

605. CAUSES.—It is very difficult to assign correct causes for this mal-position. It may be owing to some shock—coughing, for instance, or sudden uterine action, just before the head takes up its permanent position at the brim.

Dr. Simpson attributes mal-position and mal-presentations generally to the following causes:—

1. Prematurity of the labor: parturition occurring before the natural position of the fœtus is established.

2. Death of the child in utero; or, in other words, the loss of the adaptive vital reflex actions of the fœtus.

3. Causes altering the normal shape of the fœtus or contained body, or causes altering the normal shape of the uterus or containing body, and thus forcing the fœtus to assume, in its reflex movements, an unusual position in order to adapt itself to the unusual circumstances in which it happens to be placed.

4. Preternatural presentations are occasionally the result of causes physically displacing either the whole fœtus or its presenting part, during the latter periods of gestation or at the commencement of labor.

606. DIAGNOSIS.—"The presentation of the face," says Dr. Denman, "is

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[1] Glasgow Med. Journal, July, 1855, p. 180.

[2] Practical Midwifery, p. 75.

[3] On Diff. Parturition, p. 274.

[4] Die Geburtshülfliche Praxis, etc., zu Wien. Von Dr. F. H. Arneth. 1851, p. 45.

discovered by the general inequalities of the presenting part, or by the distinction of the particular parts, as the eyes, nose, mouth, or chin. There is no very great difficulty in making out this presentation before tumefaction takes place: but afterwards it may be mistaken for the breech, unless we are very careful. The bridge of the nose will be the best guide, as being prominent, firm, and unlike any part of the breech. The eyes or mouth may be confounded with the anus, and the malar bone with the tuber ischii.

607. **SYMPTOMS.**—The only effect which a face presentation has upon labor is to retard the second stage, but not to such an extent, or very rarely, as to give rise to unfavorable symptoms. The resistance to be overcome is greater, because the bones of the face and base of the cranium which pass the first through the brim, cavity, and outlet are incompressible, and because there is not the same power of adaptation; but the impediment only calls forth more energetic action on the part of the uterus, and we perceive that the progress of the labor, if slow, is still evident. The suffering, of course, is more severe, as well as more prolonged. The child when born is a frightful object in most cases: one eye closed, and the half or the entire of one cheek swollen, red, and contused; but these injuries speedily pass away, and in a day or two the face assumes its ordinary aspect. I should mention, that if a rough and careless examination of the presenting part be made in these cases, the eye may be seriously damaged, or even destroyed. The mortality amongst the children is rather more than in head presentations, but less than in any other mal-presentation.

If, as is very rarely the case, the delay should be excessive, the symptoms of powerless labor will be developed, and will call for prompt relief.

608. **TREATMENT.**—Formerly, when this mal-position was regarded as an unnatural presentation, it was held necessary or advisable to deliver the patient by art without loss of time, as appears from the statistical results of the operation. M. Portal appears to have been the first to suspect that nature might be adequate to the delivery, and Deleurye concurred in this opinion. M. Boer, in 1793, objected to any interference: and of late years it has been established as a rule, that assistance is unnecessary merely on account of the mal-position. If there should be any disproportion between the size of the head and the pelvis, or the pains should become inefficient, or accidental complications occur, then of course we must have recourse to the mildest form of assistance. If within reach, the forceps will probably be the best instrument.

In ordinary cases we must keep up the courage of the patient, and exercise all our own patience and kindness until the delivery be effected.

If there be a difficulty in establishing respiration after the birth of the child, as from the cerebral congestion there may be, the cord must be divided, and an ounce or two of blood allowed to escape, previously to applying the ligature. The child's face may be fomented with a decoction of chamomile flowers or poppy heads, and afterwards bathed frequently with a spirit lotion.

609. 2. **THE FOREHEAD TOWARDS THE ARCH OF THE PUBIS.**—When describing the mechanism of parturition, it was stated, when the head presents in the third or fourth position, it ordinarily changes into the second or first in its passage through the pelvis, but that occasionally this change of position does not take place, and that the head then passes down through the lower outlet, with the forehead turned obliquely under the arch of the pubis. When there, the head may be forced equally down, if there be room, presenting the longitudinal diameter a little modified to the antero-posterior diameter of the lower outlet, or the forehead may remain stationary at the pubis whilst the posterior part of the head sweeps over the perineum.

610. **STATISTICS.**—*Frequency.*

Authors.	Total No. of Cases.	Forehead to Pubis.
Dr. Bland	1,897	5
Dr. Merriman	2,947	44
Dr. Granville	640	2
Dr. Cusack	303	2
Dr. Maunsell	849	7
Dr. Collins	16,414	12
Dr. Storer	440	1
Mr. Crosse	1,394	26
Dr. Toogood	1,135	8
Dr. Metcalf	800	1
Dr. Pagan	8,684	31
Mr. R. U. West	2,106	59
Mr. J. Thompson	8,300	28
Drs. Johnston and Sinclair . . .	18,748	20

Thus, in 43,367 cases, the face was turned to the pubis 156 times, or about 1 in 278.

As to the result to the child; of 50 cases where the result is specified, 9 were lost.

611. CAUSES.—It is not easy to explain why the ordinary change does not take place. I have observed that it may be prevented if the pelvis be somewhat narrower than usual, and especially if it be funnel-shaped: also, if the pelvis be disproportionately large, as due resistance will then be wanting; and lastly, if very violent pains come on suddenly just after the head has entered the brim. It is probable that other causes may produce similar effects, but they are not so easily detected.

612. DIAGNOSIS.—The mal-position will be detected by the flatter shape of the forehead, which does not fill up the arch of the pubis so well as the posterior part of the head; and especially by the situation of the fontanelles, the larger one being anterior, and the smaller one posterior.

613. SYMPTOMS.—The effects of this mal-position upon labor in its second stage are by no means serious; in ordinary cases it causes some delay at the latter part of it, and calls for more expulsive force; but the effort is successful, and the child is expelled. If, however, the pelvis be narrower than usual, it may offer a considerable impediment, as a larger diameter is presented to the lower outlet than in the usual position. I have seen a few cases in which the impediment, though so slight, was sufficient to cause mischievous delay even in women who had borne children before, and whose pelvis was perfectly well formed.

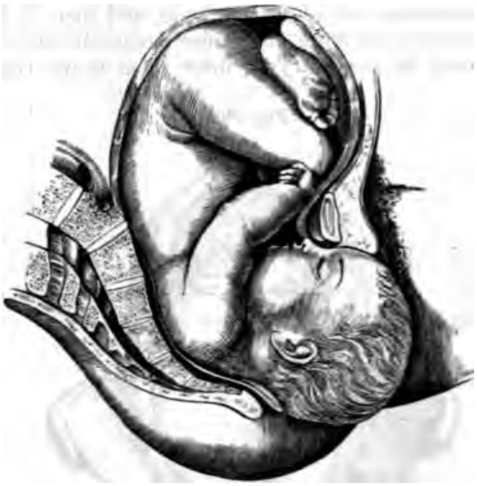
The effect upon the child is generally of no moment, unless the pelvis be so deficient as to require an operation.

614. TREATMENT.—If the pelvis be not smaller than usual, assistance will rarely be necessary; and, if we suspect a narrowing, still sufficient time must be allowed to prove whether the relative disproportion be such as the natural agents can overcome. If it be not, then, after a due and careful estimate of the obstacle, we must determine whether there is room for the application of the forceps, or whether the only alternative is craniotomy. In some few cases the forceps may be necessary from a failure of the uterine power. The time for operating must be determined by the amount of the obstacle, and the symptoms present.

615. MAL-PRESENTATIONS.—Having taken the presentation of the head as a type of natural labor, we must include the presentation of any other part of the body under the class of mal-presentations. If we were to follow implicitly Baudelocque, and other foreign authorities, there is scarcely any part of the body which may not present; but Denman, Lachapelle, and

Naegelè consider that such regions as the back, loins, belly, neck, etc., never constitute the presenting part.

Fig. 159.



Forehead under the Arch of the Pubis.

Taking the presentations in the order of frequency, we shall now inquire into

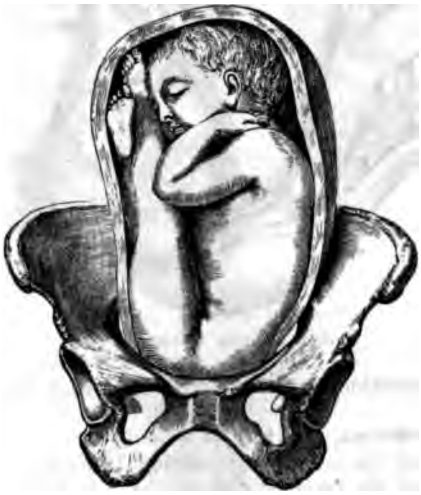
1. Breech presentations, 1 in 59½.
2. Presentation of the inferior extremities, 1 in 105.
3. " of the superior extremities, 1 in 231¾.
4. Compound presentations, where two or more parts present at the brim.

616. 1. PRESENTATION OF THE BREECH. — The breech may present itself at the brim in different positions: but as it enters it will be found to arrange itself so that either, 1, the back of the child shall be turned anteriorly towards the belly of the mother; or, 2, the back of the child shall look posteriorly towards the back of the mother. Not that the back of the child is directly anterior or posterior, but oblique, the transverse diameter of the child's hips corresponding to one or other of the oblique diameters of the brim.

"In every case," observed M. Naegelè, "whether the nates have at first a completely transverse or oblique direction, they will always be found, on pressing lower into the superior aperture of the pelvis, to have taken an oblique position, and that ischium which is directed anteriorly to stand the lowest. They pass through the entrance, cavity, and outlet of the pelvis in this position, which is oblique both as to its transverse diameter as well as to its axis."

Thus, in the *first* and most frequent position (fig. 159), the left ischium corresponds to the left acetabulum, and, being anterior, it is depressed, and presents at the os uteri, so that the finger impinges upon it if it be passed into the centre of the os uteri. In this oblique position the breech descends into the cavity, and this part first passes through the vaginal orifice, and appears between the labia; whilst the other ischium sweeps over the perineum, and the belly of the child is towards the inner surface of the right thigh of the mother. "The rest of the trunk," according to the admirable description of the author just quoted, "follows in this position; and as the breast approaches the inferior aperture of the pelvis, the shoulders pass through its superior aperture in the *left* oblique diameter; and during its passage (viz., the breast) through the pelvic outlet, the arms and elbows, which were pressed against it, are born at the same moment." It is not always the case that the arms are pressed close to the side of the child, one or both may be stretched out above the head, and then, as labor advances, first one will be pressed through the orifice (generally the right), and then the other or it may be necessary to draw them down (fig. 160). "But whilst the shoulders are descending in the above-mentioned oblique position, the head, which during the whole progress of the labor rests with its chin upon its breast, presses into the superior aperture in the direction of the *right* oblique diameter (viz., with the forehead corresponding to the right sacro-iliac synchrondrosis), and then into the cavity of the pelvis in the same direction, or one more approaching the conjugate diameter. After this, it presses through the external passage and the labia in such a manner, that while the occiput rests against the os pubis, the point of the chin, followed by the rest of the face, sweeps over the perineum as the head turns on its lateral axis from below upwards." (Fig. 161.) This brings the occipito-frontal diameter of the head in correspondence with the long diameter of the outlet.

Fig. 160.



Breech Presentation—First position.

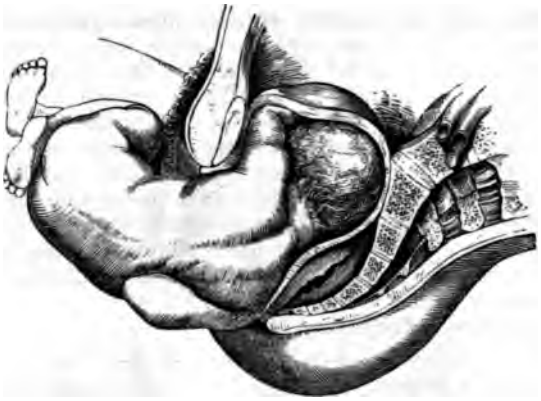
In the *second* position, the right ischium, corresponding to the right acetabulum, is turned forward and depressed, passing obliquely through the cavity and outlet in the former case, but with the direction of its surface reversed; its anterior surface being directed towards the left side of the pelvis and left thigh of the mother, whilst the head enters in the left oblique diameter.

The tumor (marked by a red or livid spot) will be found on the left or right ischium, according as it was the first or second position.

617. M. Naegelè has noticed two deviations from the ordinary mechanism of breech cases, which I shall give in his own words. First: "It sometimes happens that the body, which, directed with its anterior surface forwards and to the right, or forwards and to the left, is born as far as the shoulders,

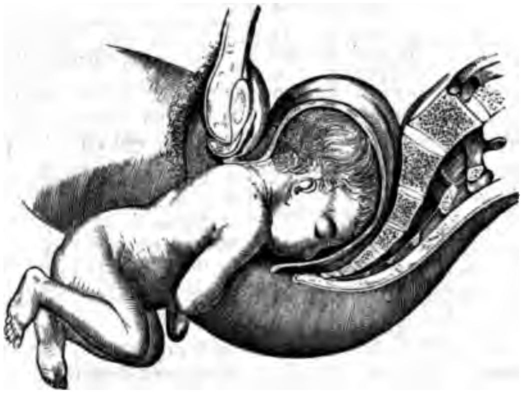
turns itself then (and frequently during the course of a single pain, by which it is fully expelled) from the side completely forwards, and then to the opposite side, so that the anterior surface of the child, which for instance in the first case, was, before the pain came on, still directed forwards and to the right, will be afterwards instantly, in the twinkling of an eye, situated backwards and to the left." Dr. Collins has noticed this change as rendering the interference recommended by some authors unnecessary.

Fig. 161.



Breech Presentation — First position.

Fig. 162.



Breech Presentation — Second position.

618. The second deviation is thus described by Naegelè. "It sometimes happens, in presentations of the nates, that the head does not rest with the chin upon the breast; but the occiput, as in those of the face, is pressed against the nape of the neck; in this case the passage of the breech through the pelvis, according to which species of nates presentation it may be, follows in the manner already described, as far as the head; this, with the occiput depressed on the nape of the neck, enters the superior aperture with

the vertex corresponding to one or other ilium of the mother, and in passing through it, and pressing lower into the cavity of the pelvis, the vertex gradually turns more and more backwards, so that when the trunk is born, the arch of the cranium is directed to the hollow of the sacrum, and the inferior surface of the under jaw to the internal one of the symphysis pubis The passage through the inferior aperture takes place in the following way, viz., whilst the under jaw presses with its inferior surface against the os pubis, the point of the occiput, with the vertex, followed by the forehead, sweeps first over the perineum." Thus bringing the occipito-mental diameter of the head into a position with the antero-posterior diameter of the outlet.

619. Thus, as I observed in speaking of the passage of the head, whether we consider the ordinary or extraordinary adaptation of the diameters in breech presentations, we see at once the admirable way in which the arrangements are calculated to provide for the passage of the child with the least possible waste of space; and it may convince us that in far more cases than we should *à priori* suppose, nature is adapted to the fulfilment of the functions of parturition; and interference, when injudicious, is more likely to impede than to further her efforts.

620.—STATISTICS.—*Frequency.*

a. *British Practice.*

Authors.	Total No. of Cases.	Breech present.
Dr. Bland . .	1,897	36
Dr. Jos. Clarke .	10,387	61
Dr. Merriman .	2,947	78
Dr. Granville . .	640	2
Edin. Lying-in-Hospital .	2,452	17
Dr. Cusack . .	701	14?
Dr. Maunsell . .	416	6
Mr. Gregory . .	691	14
Dr. Collins . .	16,414	212
Dr. Beatty . .	1,182	28
Dr. Lever . .	4,666	59
Dr. Reid . .	3,250	79
Mr. Warrington .	110	4
Mr. French . .	89	2
Dr. Churchill . .	1,525	35
Drs. M'Clintock and Hardy .	6,684	101
Dr. Storer . .	440	5
Mr. Crosse . .	1,394	25
Mr. Earle . .	4,320	41
Mr. Rose . .	600	9
Mr. Bailey . .	2,819	14
Dr. Bliss . .	771	15
Birmingham Hosp. .	650	17
Dr. Metcalf . .	300	3
Dr. Toogood . .	1,135	11
Dr. J. Lee . .	850	5
Mr. K. Watson .	800	11
Dr. Copeland . .	1,290	13
Dr. Pagan . .	8,684	131
Mr. R. U. West .	2,106	27
Mr. J. Thompson .	3,300	18
Drs. Johnston and Sinclair .	13,748	309
Dr. Hall Davis .	7,233	93

b. *French Practice.*

Authors.	Total No. of Cases.	Breech present.
Mad. Boivin . .	20,517	373
Mad. Lachapelle .	15,652	349
M. Ramboux . .	491	4
M. Dubois . .	10,742	391
Hôtel Dieu, Paris .	280	3
M. Mazzoni . .	452	5
Dr. de Belli . .	2,739	44

c. *German Practice.*

Authors.	Total No. of Cases.	Breech present.
M. Richter . .	2,571	48
Moschner and Kursak .	12,329	125
A. E. v. Siebold .	1,944	44
E. C. v. Siebold .	1,165	18
M. Kilian . .	2,350	125
M. Naegelè . .	1,411	76
Dr. Merrem . .	299	14
Dr. Henne . .	555	6
Dr. Klugè . .	1,074	27
Dr. Carus . .	2,908	43
Dr. Brunatti . .	295	6
Wurtzburg Hospital	637	18
Dr. Theys . .	28	1
Dr. Adelmann .	53	2
Dr. Arneth . .	6,608	113
Prof. Schwerer .	21,804	97

Thus in British practice, breech presentation occurred 1363 times in 91,651 cases, or about 1 in 67½; in French practice 1169 times in 50,873 cases, or about 1 in 42¾; and in German practice 793 times in 54,794 cases, or about 1 in 66½; the entire number of breech presentations being 3325 in 197,318 cases, or about 1 in 59⅓.

The following table exhibits the result to the child in as many cases as I could collect:

Authors.	No. of Breech Presentations.	Children lost.
Mr. Giffard	13	4
Dr. Smellie	27	16
Mr. Perfect	9	2
Dr. Jos. Clarke	61	21
Dr. Ramsbotham	14	7
Dr. Merriman	79	9
Edinburgh Hospital	17	5
Mr. Gregory	14	4
Dr. Collins	242	73
Dr. Beatty	28	12
Mr. Lever	59	30
Dr. Churchill	35	14
Drs. M'Clintock and Hardy	80	34
Dr. Metcalf	8	0
Dr. Storer	5	0
Dr. Arneth	113	19
Mr. J. Thompson	18	5
Drs. Johnston and Sinclair[1]	258	84
Dr. Hall Davis	93	18

Thus, in 1148 cases of breech presentations, 337 children were lost, or about 1 in 3⅓.

621. Diagnosis.—The breech of the child is distinguished by its roundness and softness, by the cleft between the buttocks, by the anus and by the organs of generation; and it would seem unlikely that it should be mistaken for anything else. Yet it may be confounded with a face presentation which has advanced slowly, and where there is much swelling; to the touch there is really a great similarity, but in the latter we have the bridge of the nose obliquely across the os uteri, and in the former the more or less movable coccyx may be felt close to the anus, and joining the broader and firm sacrum. This will also distinguish it from a shoulder presentation, which might be mistaken for one of the tubera ischii.

The discharge of meconium is of very little value, as it occurs in head presentations, although in the latter case Dr. Collins remarks, "it comes away in a more fluid state, and has not its natural appearance, being mixed with the discharges from the uterus and vagina;" nor is it found on the end of the finger after examination.

622. Symptoms.—The duration of the labor varies a good deal; in some cases, it is concluded as quickly as if the head descended, in others it is more tedious; there is more delay when the arms are stretched upwards than when they are down by the side. There is also delay in the expulsion of the head, owing to the incompressibility of the base of the skull, which is the first to enter, and its being less able to adapt itself to the brim. It is

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[1] Fifty-six in addition were putrid, and one in addition to Dr. Davis's cases; but in estimating the mortality resulting from the presentation, these clearly ought not to be included.

very seldom that any bad symptoms arise on the part of the mother, as assistance is generally afforded; but there is danger that mischief may be done if the interference be not judiciously timed, and gently executed. If there be any narrowing of the brim, there will be proportionate delay; and if the patient be not delivered, the symptoms of powerless labor may be developed.

That there is danger to the child, the statistics I have given prove, more than one in four being lost, and this is owing to the delay in the transmission of the head. The body does not dilate the passages so well as the head, as the head is wider than any part of the body, or at least the body may be compressed into a smaller space than the head. This of course occasions the head to pass slowly; but besides, a little time is required to allow of the adaptation of the head to the brim, cavity and outlet, and for such compression as can be made; and as, during this time, the cord is exposed to pressure, it is not surprising that asphyxia or pulmonary apoplexy should result, of which the child generally dies. Even where the life of the child is saved, the pressure to which the organs of generation have been exposed may be followed by inflammation and sloughing, according to Denman.

623. TREATMENT.—A very minute and thorough examination is necessary in these cases, to assure ourselves of the accuracy of our diagnosis; but this once done, the less frequently the examinations are renewed the better, lest the parts should be irritated. As to the actual management, I must repeat what I have said before, that the less interference the better for the patient. Dr. Collins remarks most soundly, that "the most common and dangerous error committed by the medical attendant arises from officious and injudicious attempts to hasten or assist during the early stages of labor, than which he could not well adopt a more hazardous course. No interference whatever is required until the breech shall have been expelled through the external parts, unless the uterine action be inadequate to effect this; otherwise the child must often be forfeited, owing to the difficulty experienced in consequence of the soft parts being badly prepared to admit the passage of the head. This being the most critical part of the delivery, should much delay take place, the continued pressure on the funis speedily deprives the child of life. To guard against this, therefore, the breech should be permitted to pass slowly and unassisted, so as gradually and perfectly to dilate the soft parts, thereby gradually facilitating the completion of the labor."

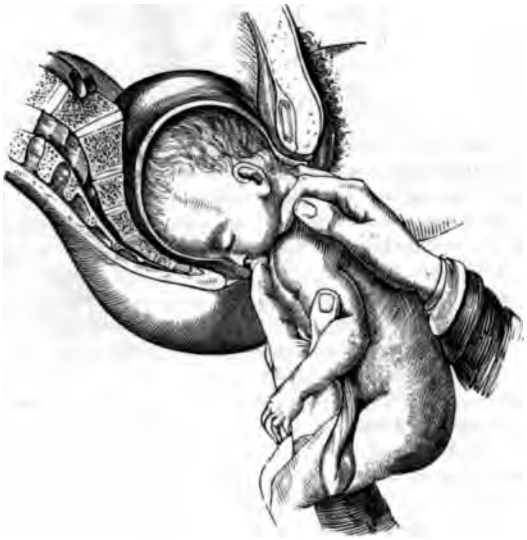
At the same time, as the breech passes, the perineum must be carefully guarded with the left hand, whilst the right is employed in supporting the child as it is expelled, and carrying it forwards and downwards towards the legs of the mother, allowing it perfect liberty to change its position, or make such turns as the mechanism may impress upon it. It will rarely, if ever, be necessary for us to attempt to adapt the child to the passages, as we have seen that even when the head is in an apparently unfavorable position at the brim, it rectifies itself in the cavity. What we must do, is to offer no impediment to these changes.

When the umbilicus appears at the external orifice, the danger from pressure on the funis commences; the cord should be drawn down a little, and removed as much as possible out of the way of pressure. The strength of the pulsations is an important guide as to the necessity for assistance: if they be strong, we can allow a little time for the natural powers to act; if, on the contrary, they be very weak, we must expedite the delivery as much as possible, consistent with the safety of the mother, by drawing down the body of the child during a pain.

When the chest is through the external parts, the arms may offer a difficulty; if they be close to the side of the child, we shall have no trouble, but if above the side of the head they must be brought down by passing one or two fingers over the shoulder as near as possible to the elbow, and then drawing the arm across the face and chest until the elbow arrives at the external orifice: having extracted one, the other is easily liberated, and it is generally easier to begin with the one nearest the perineum. Great care must be taken not to draw directly downwards, or we may break the arm, but across the front of the child, and neither violently nor suddenly, or much mischief may be done to the soft passages.

When the arms are free, the shoulders will pass out, and the head of the child will take up its position at the brim in the manner described; but here there is a considerable delay. If there be no demand for prompt delivery, and the cord pulsate strongly, it is better not to interfere, and when the head is in the cavity, two fingers of the left hand may be introduced and placed in the mouth, or, what is better, on the upper jaw, which, for many reasons, is more suitable than the lower, as usually recommended, and pressure made so as to depress the chin upon the breast; thus presenting a shorter diameter of the head to the lower outlet, and facilitating the expulsion of the head. The body of the child should be carried forward quite to the thighs of the mother, and extracting force, varying in amount according to the exigency of the case, applied to the shoulders, in the direction of the axis of the lower outlet. "In some few cases," Dr. Collins says, "advantage is derived from pushing up the head a little so as to alter its position." This manœuvre, when dexterously executed, will generally extricate the head with ease and promptitude, if the patient have had children In these cases it is peculiarly necessary that pressure should be applied over the uterus from the time that the chest is expelled, in order to secure the regular expulsion of the after-birth.

Fig. 163.



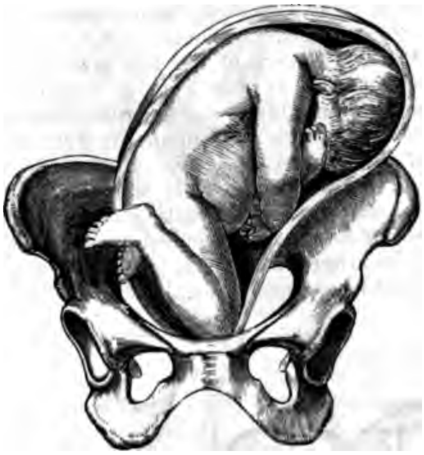
Breech Presentation — Extraction of Head.

624. But if the uterine power should fail (as in powerless labor), or any circumstances demand speedy delivery before the breech is expelled, one or two fingers should be passed into the groin, and assistance gently and steadily afforded during a pain. The blunt hook is frequently used for this purpose, but it has serious disadvantages, and if used incautiously, the thigh

of the child may be fractured. After the breech is born, we may extract by grasping the body of the child, covered with a napkin; and let me impress upon my junior readers, that extracting force, to be successful (not to say safe) must always be made in the axis of the brim or outlet, at whichever part the resistance may be.

In some cases, however, the head is not so easily extracted, and I perfectly agree with Dr. Collins, that "should there be any considerable obstruction to the getting away of the head, we are by no means justified in using violence; the soft parts of the mother will be sure to suffer from such a mode of proceeding, and on the child's part, nothing is to be gained, as it is destroyed by pressure on the funis, continued during the time the ordinary efforts have been diligently but unsuccessfully employed for its delivery." If the pulsation in the cord have ceased, "the only safe plan under these circumstances will be to lessen the head by means of an opening made behind one or both ears." If the pulsation be good, it will be right to try the forceps, provided they can be introduced without difficulty; but we must remember that we cannot in these cases gain much space by compression, because we grasp the base of the skull.

Fig. 164.



Presentation of Inferior Extremities.

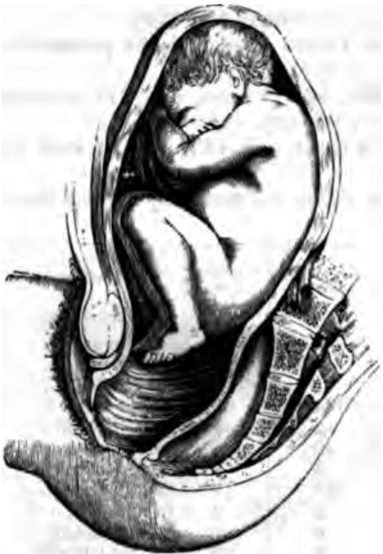
625. 2. Presentation of the Inferior Extremities.—Under this head I include presentations of one or both of the knees or feet, as the former are always converted into footling cases as the labor advances. In point of frequency they stand next to breech presentations.

626. Mechanism.—Adopting Naegelè's arrangement, we shall make but two divisions of this mal-presentation. 1. When the toes are directed backwards, and 2, when the toes are directed forwards. The former is the more frequent, and both correspond to the two classes of breech presentations.

As we should expect, the feet, meeting with no resistance to fix them, are liable to change their position during their descent, until the hips enter the brim, which they do precisely as was described in breech cases (§ 617). In fact, in its further progress the case is identical with breech cases, and the description already given will serve as well for footling cases, on which account I need not repeat it.

The expulsion of the body of the child may be more rapid, owing to the absence of the additional bulk of the thigh when doubled up on the abdomen, but it is just so much the less safe for the child.

Fig. 165.



Presentation of Inferior Extremities.

627. Statistics.—*Frequency.*

a. *British and American Practice.*

Authors.	Total No. of Cases.	Pres. of Infr. Ex.
Dr. Bland . .	1,897	18
Dr. Jos. Clarke .	10,387	184
Dr. Granville . .	640	3
Dr. Merriman .	2,947	40
Ed. Lying-in Hosp..	2,452	8
Mr. Gregory . .	691	7
Dr. Maunsell . .	839	21
Dr. Beatty . .	1,182	15
Dr. Collins . .	16,414	187
Dr. Lever . .	4,666	29
Mr. French . .	89	1
Dr. Churchill . .	1,525	22
Drs. M'Clintock and Hardy . .	6,634	38
Dr. Murphy . .	467	6
Dr. Storer . .	440	2
Mr. Crosse . .	1,394	6
Mr. Earle . .	4,320	40
Birmingham Hosp. .	650	2
Dr. Bliss . .	771	8
Dr. Metcalf . .	360	4
Mr. Rose . .	600	7
Mr. Bailey . .	2,819	29
Dr. Toogood . .	1,135	3
Dr. J. Lee. . .	850	13
Dr. Copeland . .	1,290	10
Dr. Pagan . .	8,684	113
Mr. R. U. West .	2,106	29
Mr. J. Thompson .	3,300	8
Drs. Johnston and Sinclair	13,748	181
Dr. Hall Davis .	7,302	44

b. *French and Italian Practice.*

Authors.	Total No. of Cases.	Pres. of Infr. Ex.
Mad. Boivin . .	20,517	242
Mad. Lachapelle .	15,652	247
M. Ramboux . .	501	3
Dr. de Belli . .	2,739	32

c. *German Practice.*

Authors.	Total No. of Cases.	Pres. of Infr. Ex.
Moschner and Kursak .	12,329	82
M. Richter . .	2,571	30
A. E. v. Siebold .	2,059	25
E. C. v. Siebold .	947	11
Dr. Kilian . .	2,350	8
Dr. Carus . .	2,908	23
Dr. Klugè . .	1,074	17
Dr. Brunatti . .	295	3
Dr. Theys . .	21	2
Dr. Adelmann .	53	2
Dr. Arneth . .	6,608	59
Prof. Schwerer .	21,804	119

Thus in British practice, we have 93,749 cases, and 935 presentations of the inferior extremities, or about 1 in 100¼.

In French practice, 45,409 cases, and 524 presentations of the inferior extremities, or about 1 in 86¾.

In German practice, 53,019 cases, and 372 presentations of the inferior extremities, or about 1 in 142½.

Altogether 192,174 cases, and 1831 foot or knee presentations, or about 1 in 105.

The following table shows the mortality among the children :—

Authors.	Footling Cases.	Children lost.	Authors.	Footling Cases.	Children lost.
Mr. Giffard . .	28	18	Mr. Gregory . .	7	3
Dr. Smellie . .	9	8	Dr. Beatty . .	15	10
Mr. Perfect . .	11	6	Dr. Collins . .	187	73
Dr. Jos. Clarke .	184	62	Dr. Lever . .	29	16
Dr. Ramsbotham .	2	1	Dr. Churchill . .	22	10
Dr. Merriman .	40	6	Drs. M'Clintock and Hardy .	25	5
Edin. Hospital .	8	2			
Dr. Arneth . .	59	11	Mr. J. Thompson .	8	0
Dr. Metcalf . .	4	2	Drs. Johnston and Sinclair .	127	59
Dr. Murphy . .	6	1			
Dr. Storer . .	2	2	Dr. Hall Davis .	44	18

This gives a very large mortality, 303 children being lost out of 812, or about 1 in 2½.

628. Symptoms.—The first circumstance in the labor which excites our suspicions of its being unnatural, is very often the early rupture of the membranes, and the large quantity of liquor amnii which escapes, and on making an examination, we discover the absence of the head blocking up the brim, although we may not be able to make out the presentation. As the labor advances one or both of the feet or the knees descend through the os uteri, sometimes with the toes pointing downwards, but more frequently bent up towards the tibia. An examination at this period will enable us to form a diagnosis. The labor proceeds gradually, and the hips descend into the pelvis; then the chest, shoulders, and the head, precisely as described in breech presentations, and with the same evolutions and adaptations.

Danger to the mother can only arise from a prolongation of the second stage, or injury to the passages, and there is little risk of either so long as violent efforts be not made to extricate the child, and if the pelvis be well formed.

The danger to the child is greater than in breech presentations, one in two and a half being lost, and from precisely the same cause which made the latter more dangerous than head presentations—*viz.*, the inadequate dilatation of the passages. The child passes through as a wedge, and each succeeding part being wider than the preceding, has to effect dilatation sufficient for itself, and that at a stage when time is of great value from the pressure to which the child is exposed. The breech, with the legs turned up, is certainly less bulky than the head, and therefore prepares badly for the quick transit of the latter; but if the size of the breech be diminished by the thighs being extended, it is clear that much greater resistance and delay of the head will result: and in this greater delay and consequent prolongation of the pressure upon the funis is the explanation of the increased mortality.

629. Diagnosis.—Footling presentations, when high up in the pelvis,

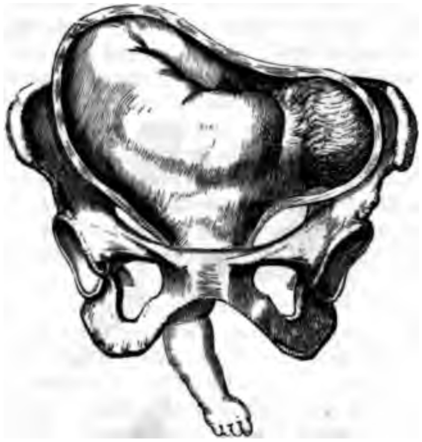
may be confounded with presentations of the hand; and if one foot only be down, the heel may be mistaken for an elbow. However, a little care will enable us to distinguish them. For instance, the foot is longer and the sole flatter than the hand; the toes are shorter, and more equal in length than the fingers, and the great toe does not separate from the others, as the thumb does from the fingers. The presence of the heel, with the ankle-bone on each side, is quite different from the hand and wrist. Tracing from the heel along the sole of the foot to the toes, will, of course, distinguish the heel from the elbow. In an examination, the knee may be distinguished from the elbow, for which it may in some degrée be mistaken, Naegelè remarks, in that it is thicker, that it has two prominences, and a depression between them; while on the other hand, the elbow, which is thinner, presents to the feel between the two prominences a projection in which it seems to end.

630. Treatment. — In every particular, the treatment of breech presentations applies to footling cases, except that I think there is rather more temptation to pull down the child at an early period, because of the greater facility for so doing; but, from what I have said, it must be evident that it is more necessary that the labor should be let alone. There can be no occasion to interfere until the pressure upon the funis is felt, *i. e.*, until the umbilicus is visible, and then the risk to the child must decide upon whether assistance is to be given or not. The same method must be adopted for extricating the arms, and for facilitating the expulsion of the head: and in the more difficult cases we have the same remedies at command.

631. 3. Presentation of the superior extremities.—In almost all cases of this kind, it is the shoulder which primarily presents, and afterwards the arm prolapses; occasionally however we find the hand at the beginning of the labor at the os uteri, and more rarely the elbow.

In all cases the back of the child either looks forward towards the abdomen of the mother (fig. 166), or backward towards her spine (fig. 167); the former being twice as frequent as the latter.

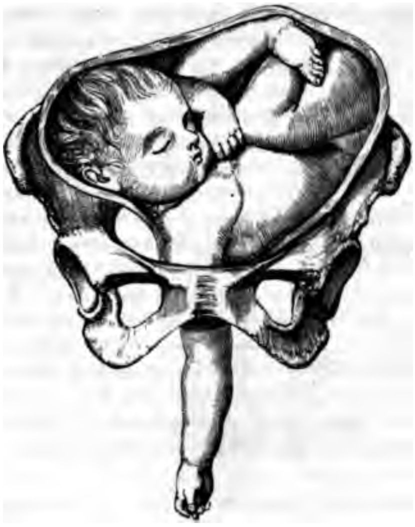
Fig. 166.



Arm Presentation — First position.

In the majority of cases, with such a position of the child, labor may be considered as impracticable, unless assisted by art; and yet even with such an untoward position, the natural powers have occasionally succeeded in expelling the child. Dr. Denman, in 1772, first noticed the fact, and he supposed that, during an interval of uterine relaxation, the shoulder and arm receded, and the breech came down into the pelvis; hence the name he gave to it, "*spontaneous evolution of the fœtus.*"

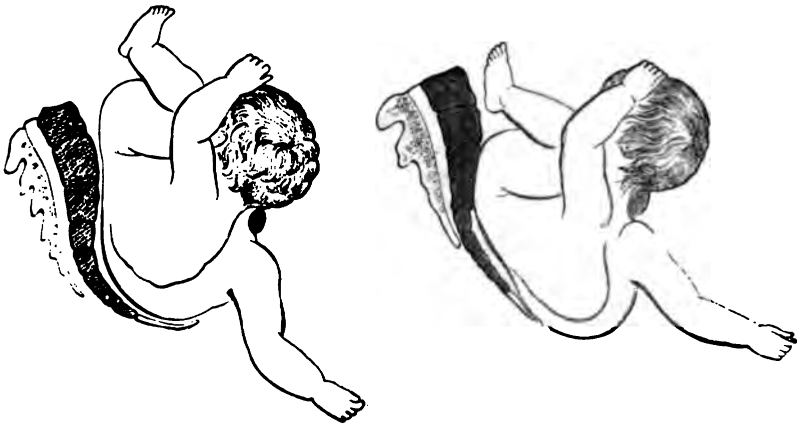
Fig. 167.



Arm Presentation — Second position.

This explanation of the process, which I hastily attributed to a mistake on Denman's part in a former edition, has, however, been confirmed by other observers—for example, M. Boer, Dr. Mitchell,[1] Dr. Dyce,[2] and Mr. Crosse.[3]

Fig. 168. Fig. 169.



Arm Presentation.

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[1] Charleston Med. Journ., May, 1850.

[2] Edin. Monthly Journal, May, 1850, p. 487.

[3] Cases in Midwifery, p. 105.

That there is another and more common mode in which the evolution takes place is certain, for I have seen it from beginning to end, and for the true explanation of which we are indebted to the accurate observation and ingenuity of my friend, the late Dr. Douglas, a distinguished practitioner of this city, in an essay published in 1811, from which the following short description is extracted. Before its expulsion, the situation of the fœtus "resembles the larger segment of a circle; the head rests on the pubis internally, the clavicle presses against the pubis externally, with the acromion stretching towards the mons veneris (fig. 168): the arm and shoulder are entirely protruded, with one side of the thorax not only appearing at the os externum, but partly without it: the lower part of the same side of the trunk presses on the perineum, with the breech either in the hollow of the sacrum or at the brim of the pelvis, ready to descend into it (fig. 169); and by a few further uterine efforts the remainder of the trunk, with the lower extremities, is expelled (fig. 170). And to be more minutely explanatory of this ultimate stage of the process, I have to state that the breech is not expelled exactly sideways, as the upper part of the trunk had previously been; for, during the progress of that pain by which the evolution in completed, there is a twist made, about the centre of the curve, at the lumbar vertebræ, when both buttocks, instead of the side of one of them, are thrown against the perineum, distending it very much; and immediately after the breech, with the lower extremities, issues forth; the upper and back part of it appearing first, as if the back of the child had originally formed the convex, and its front the concave side of the curve."

Fig. 170.

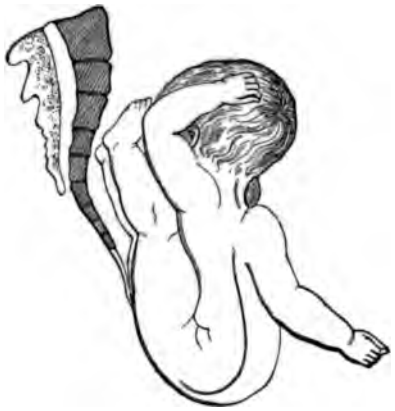
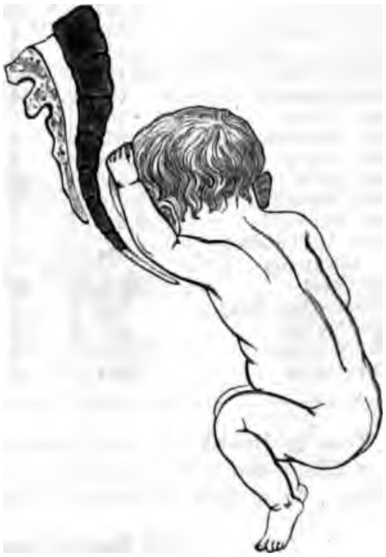


Fig. 171.



Arm Presentation.

Thus the head and the shoulder depressed in the pelvis are fixed, and the remainder of the body doubled up, is, inch by inch, forced into the pelvis, and through the external parts, until all below the arm is expelled, leaving the case to be terminated as a breech or foot presentation (fig. 171). At no part of the process is the arm at all retracted; but if moved at all, it is still further protruded: the name of "spontaneous expulsion," given by Dr. Douglas, is therefore more suitable than that of "spontaneous evolution." An essential condition of this extraordinary effort of nature, is the relative disproportion of the fœtus and pelvis; either the fœtus must be smaller, or the pelvis larger than usual, to permit it. The accuracy of Dr. Douglas's explanation has been proved by the observations of Dr. Gooch and others. I can also add my testimony, having some years ago had an opportunity of witnessing the entire process.

It sometimes happens in arm presentations, when the child is small and the pelvis large, and especially with premature births, that the child is expelled double. Dr. Dyce describes a case in which the shoulder and buttocks were brought down nearly together, the arch formed by the body looking downwards.[1]

I have seen the reverse more than once, and I think it is the more common, *i. e.*, where the body doubled is protruded, the extremities, back, and head being above.

632.—STATISTICS.—*Frequency.*

Authors.	Total No. of Cases.	Pres. of Sup. Ex.
a. *British Practice.*		
Dr. Bland	1,897	8
Dr. Jos. Clarke	10,387	48
Dr. Merriman	2,947	19
Dr. Granville	640	1
Ed. Lying-in-Hosp.	2,452	4
Dr. Collins	16,414	40
Mr. Gregory	694	4
Dr. Cusack	701	5
Dr. Maunsell	839	4
Dr. Beatty	1,182	4
Dr. Lever	4,666	12
Mr. Mantell	2,510	4
Dr. Churchill	1,525	9
Drs. M'Clintock and Hardy	6,634	26
Dr. Reid	5,691	29
Birmingham Hosp.	650	4
Dr. Murphy	467	2
Dr. Copeland	1,290	4
Mr. Crosse	1,394	3
Mr. Earle	4,320	34
Mr. Rose	600	3
Mr. Bailey	2,819	7
Dr. Toogood	1,135	3
Dr. J. Lee	850	3
Mr. K. Watson	800	11
Mr. J. Thompson	3,300	5
Drs. Johnston and Sinclair	13,748	60
Dr. Hall Davis	7,302	25
b. *French Practice.*		
Mad. Boivin	20,517	80
Mad. Lachapelle	15,652	68
M. Ramboux	491	4
Dr. de Belli	2,739	37
Wurtzburg Hospital	637	3

Thus in British practice it occurred 382 times in 96,454 cases, or about 1 in 252½; and in French practice, 192 times in 40,036 cases, or about 1 in 208½. Altogether 574 times in 136,490 cases, or about 1 in 208½.

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[1] Ed. Monthly Journal, May, 1850, p. 483.

Authors.	Presentation of Superior Extremities.	Mothers lost.	Children lost.	Delivered by	
				Version.	Crotcht.
Mr. Giffard	24	0	15	21	. .
Dr. Smellie	34	8	19	28	. .
Mr. Perfect	6	1	2	6	. .
Dr. Jos. Clarke	48	6	21	. .	. .
Dr. Ramsbotham	27	6	18	12	11
Dr. Merriman	19	. .	2	. .	. .
Edin. Hospital	4	. .	2	. .	. .
Dr. Collins	40	4	20	. .	. .
Mr. Gregory	4	. .	3	. .	. .
Dr. Cusack	5	0	2	4	. .
Dr. Maunsell	4	. .	4	2	. .
Dr. Beatty	4	1	4	4	. .
Mr. Lever	12	3	8	. .	. .
Dr. Churchill	9	0	5	9	. .
Drs. Hardy and M'Clintock	26	2	. .	19	4
Dr. Murphy	2	. .	2	. .	. .
Mr. J. Thompson	5	1	5	. .	. .
Drs. Johnson and Sinclair	42	3	28	25	. .
Dr. Hall Davis	25	. .	15	20	2

The second of the preceding tables is intended to show the mortality to both mother and child, so far as it is mentioned by the author: where it has not been recorded, I have left the space blank; but if either died, I have so specified. I have thought it worth while, also, to add some columns showing the different modes of delivery practised.

From this record we find, that out of 314 cases of presentation of the superior extremities, 175 children were lost, or rather more than one-half. Out of 282 cases, 30 mothers were lost, or nearly 1 in 9.

633. SYMPTOMS. — Labor with this mal-presentation is, as the statistics show, extremely dangerous to the mother and child, and especially as the remedy involves a very serious operation. Dr. Rigby has given a graphic picture of a case of this kind when unassisted: "After the membranes have burst, and discharged more liquor amnii than in general when the head or nates presents, the uterus contracts tighter around the child, and the shoulder is gradually pressed deeper in the pelvis, while the pains increase considerably in violence from the child being unable, from its faulty position, to yield to the expulsive efforts of nature. Drained of its liquor amnii, the uterus remains in its state of contraction even during the intervals of the pains; the consequence of this general and continued pressure is, that the child is destroyed from the circulation in the placenta being interrupted, the mother becomes exhausted, and inflammation or rupture of the uterus and vagina are the almost unavoidable results."

On the part of the mother, so long as the labor is virtually in the first stage, the symptoms are perfectly natural and favorable; but after the second stage (marked by voluntary effort and change of cry) has lasted for some time, then we have in detail the symptoms of powerless labor, exactly as I have described them; but with a difference in the results, owing to the mechanical obstructions offered by the mal-position of the child; and I regard these cases as the most striking illustration of the fact I have repeatedly pressed upon the reader's attention — viz., that the development of unfavorable symptoms is owing to the stage at which the delay occurs, and not to the kind of impediment; for here we find that the same symptoms arise from a purely mechanical impediment on the part of the child, the uterine system being in perfect integrity, as we found to result from inefficient pains, from tumors in the soft passages, or from deformity of the pelvis.

634. DIAGNOSIS.—Our first suspicion will probably arise from finding, on examination, that we are not able to reach the presentation; this, of course, proves nothing; but it ought to induce a very careful investigation, and we may find the os uteri very little dilated, and suffering comparatively little pressure during each pain, or the hand may be felt protruding through the undilated os uteri. The high situation of the presentation (if it be the shoulder) renders it difficult to ascertain the part which is descending. We may derive confirmation of our suspicions from finding the bag of the membranes protruding, of a conical or elongated form, and evidently not covering the head.

When the shoulder has descended a little, we may be able to reach the axilla, and we shall find that the shoulder is rounder than the elbow, and has not the condyles of the humerus, so that this will decide the point for us.

The hand may be mistaken for the foot; but its shortness, the length of the fingers, and the divarication of the thumb, will enable us to distinguish it. The situation of the thumb, and the aspect of the palm of the hand, will mark whether it is the right hand or the left.

635. CAUSES. — This mal-presentation has been attributed to irregular early contractions of the uterus, to irregular distention, to obliquity, etc. etc. They may possibly have some such effect; but I think all the explanations as yet offered are insufficient. Dr. Rigby concludes:—"We may, therefore, state that the causes of arm or shoulder presentations are of two kinds, viz., when the uterus has been distended by an unusual quantity of liquor amnii, or when, from a faulty condition of the early pains of labor, its form has been altered, and with it the position of the child."

636. TREATMENT.—As (with very few exceptions) the labor is impracticable, we have nothing to expect from the natural efforts except an increase of difficulty, it becomes our duty to interfere promptly in every case. Should the mal-presentation have been detected before the rupture of the membranes, and before the os uteri is fully dilated, we may wait for a time to allow of as complete dilatation as possible; nor is there any risk so long as the membranes are entire. But if they have given way, we ought not, and if the os uteri be fully dilated (whether the membranes be entire or not) we must not wait a moment, but proceed to deliver by turning. When the liquor amnii has not escaped, there is seldom any difficulty, but after that event, we generally find the uterus more or less strongly contracted upon the child, and in proportion to this contraction is the difficulty. If the uterine action be very intense, the operation may be impossible without risk of rupturing the uterus; and in such cases, instead of proceeding at once to turn, a dose of tartar emetic or opium, or a combination of both, may be given, so as to moderate or suspend uterine action, and admit of the introduction of the hand. If the pulse be quick and strong, venesection may be beneficial. I have already given the details of the operation of turning.

[Dr. Churchill, in his recommendation of bleeding in the cases referred to, does not exhibit that decision which the importance and efficiency of the measure would seem to demand. When, in cases where turning is demanded, the waters are evacuated, and the uterine contractions so strong as to render the operation difficult and dangerous, there is no remedy equal to free blood-letting, pushed even *ad deliquium*, a full dose of laudanum being given, at the same time, to prevent any undue reaction. If the practitioner is prompt and skilful, he may effect the turning before the relaxation produced by the bleeding shall have passed off. It is unnecessary in these cases to lose time by searching for both feet, as delivery can be accomplished equally well by bringing down only one, while the risk to the child is less. If, however, the child be dead, or there is much hemorrhage, it will be proper to seize and bring down both feet, with the view of accomplishing the delivery more rapidly, provided always both can be gained without much delay or difficulty.]

Should these measures fail, and version be impracticable, we must open the chest of the child, and eviscerate; after which it may be extracted by the crotchet. "Several writers," says Dr Collins, "recommend, in difficult cases of this nature, the separation of the child's head, so as to bring the body away by the presenting arm, and afterwards deliver the head by the crotchet; this we would condemn, unless we failed in our efforts, by breaking down the thorax, which is very unlikely, if the operation be properly performed, and the pelvis not extremely under size. We once saw a delivery effected as above described, and the greatest difficulty was experienced in the extraction of the head; it was necessary to introduce the hand to bring it into the vagina, and then it had to be lessened before it could be removed."

637. But, it will at once be asked, what practical application can be made of our knowledge of the occurrence of spontaneous expulsion? I am afraid not much. I am satisfied that we ought not to wait for it in any case in which turning can easily be accomplished, because, if it did not occur (and, according to Dr. Douglas, it does not occur above once in ten thousand labors), the operation will be rendered tenfold more difficult, from the greater depression of the child, and more energetic action of the uterus; it would, in fact, be exchanging a comparatively easy and not very dangerous operation for a very difficult one, in which the risk to the mother would be great, and the death of the child certain, provided this rare phenomenon did not occur. I think, however, that in such a case as Dr. Douglas has described, we may venture upon a little delay, to afford a chance of spontaneous expulsion. "If the arm of the fœtus," says Dr. Douglas, "should be almost entirely protruded, with the shoulder pressing on the perineum; if a considerable portion of its thorax be in the hollow of the sacrum, with the axilla low in the pelvis; if, with this disposition, the uterine efforts be still powerful, and if the thorax be forced sensibly lower during the pressure of each successive pain, the evolution may with great confidence be expected."

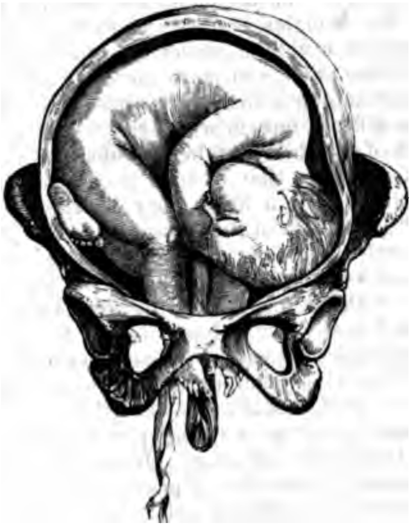
[Dr. M. B. Wright of Cincinnati, in an essay which appeared a few years since, and to which a gold medal was awarded by the Medical Society of the State of Ohio, has presented a strong plea in favor of cephalic version in cases of arm or shoulder presentation. He maintains that it may be performed whenever turning by the feet is practicable, even, indeed, when this cannot be effected, and with greater safety to mother and child. There cannot, we think, be any doubt as to the possibility in certain favorable cases of arm or shoulder presentation — when the head of the fœtus is small and the pelvis large — of cephalic version, particularly in the manner practised by Dr. Wright, being effected; and whenever such is the case there is unquestionably a greater probability of the child being saved than when podalic version is resorted to. In complex and complicated cases of shoulder presentation, however, though not absolutely impracticable, cephalic version is always attended with great difficulty, and is as replete with danger to both mother and child as turning by the feet. To such cases it is altogether unadapted. Even under the most favorable circumstances, we are to recollect that after the mal-position of the head has been rectified by cephalic version, notwithstanding the pain and risk to which the female has been subjected, the delivery is still to be effected by the regular contractions of the uterus — by a "labor" that may, for all we know, be sufficiently tedious and painful to produce an amount of exhaustion as shall require, to insure the safety of the patient, a resort to instrumental delivery;—hence, it is evident that, under all such circumstances as indicate the necessity for a speedy termination of the labor, podalic is invariably to be preferred to cephalic version.]

As the minute details of management are the same in natural and unnatural labors, I have not thought it necessary to repeat them, but refer the reader to the chapter on that subject.

638. 4. COMPOUND PRESENTATIONS.—From an untoward position of the body or extremities of the child, one or more parts may come together to the os uteri; in some cases merely adding to the bulk to be transmitted through the passages without altogether preventing it, in others rendering interference necessary for the delivery. For instance:—

1. *The hand or arm may present with the head*, of course adding to its size, and perhaps, if the pelvis be small, prohibiting its entrance into the passage. As a general rule, the hand or arm is stretched out or placed along the side of the head, descending with it or before it; but Dr. Simpson has met with a case in which the fore-arm was placed across the back of the head and neck, at once increasing the bulk and opposing a projecting obstruction which caught upon the brim of the pelvis. He brought the hand downwards and forwards: but the pains proving insufficient, and the child getting weak, he delivered by podalic version.[1] Nor is this compound presentation without danger if the uterine action be violent. Dr. James Gray has related a case in which the hand, presenting with the head, was forced through the walls of the vagina and rectum.[2] Such cases, however, are very rare. Compound presentations, as Dr. Merriman has observed, rarely occur except when the pelvis is large. In the cases recorded, by Drs. Jos. Clarke, Collins, and Jansen, no example is mentioned: and in those of Mesdames Lachapelle and Boivin only three, *i.e.*, three cases in 75,903 deliveries. For which reason, if it be discovered early, a cautious attempt should be made to replace the arm above the head, so as to allow it to descend; but, above all things, we must be cautious neither to draw down

Fig. 172.



Compound Presentations—Hand, Foot, and Funis.

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[1] Ranking's Abstract, vol. ii, p. 263.

[2] Edinburgh Monthly Journal, Jan., 1851.

the hand nor to displace the head, as either may convert a simple manageable case into an arm presentation.

If the arm cannot be replaced, the case must then be treated as one of relative disproportion; perhaps a little time and extra uterine action (which is generally exerted, as we have said, in proportion to the demand for it) may suffice: if not, and the delay should excite unfavorable symptoms, we must first see if the forceps are applicable, or version, and, as a last resource, if all others fail, we must lessen the head. I prefer the forceps to version, because of its inferior mortality as regards both mother and child; and version (when possible) to the crotchet, for the same reason.

2. *The feet and hands may present*, or one of each, and in these cases it not unfrequently happens that the cord prolapses (fig. 172) from the upper outlet not being filled by the presenting part.

In such cases, it is evident that one or other extremity must descend and give the character to the labor, making it an arm or footling case.

Now it is exactly for the determination of this question that we ought to interfere. There can be no doubt of the propriety of drawing down the foot or feet into the pelvis so as to preclude the possibility of the arm descending, and when this is done, the case is one of footling presentation, and to be managed accordingly. But I must repeat my caution, that the greatest care is necessary, first, not to mistake a hand for a foot, and, secondly, not to favor the descent of the hand and arm by the mode of examining.

Prolapse of the cord increases the danger to the child, and may (according to the rules laid down) require us to hasten the labor, if the pulsations be weak and the woman have previously had children.

CHAPTER XVII.

PARTURITION.—CLASS II. UNNATURAL LABOR.

ORDER 6. PLURAL BIRTHS.—MONSTERS.

639. 1. PLURAL BIRTHS. — I have already stated the signs by which twin pregnancy is to be recognized, and also that in the majority of cases they are very dubious. Each child possesses its special envelopes and a separate placenta, though they are sometimes so pressed together as to appear but one, and occasionally a vascular communication passes from one to the other. The labor is often premature, and the children are generally smaller than usual.

The mode of transmission of each child may be perfectly natural, or either or both may come under some of the orders of unnatural labor already described, requiring the management suitable for such cases: so far, a separate notice of plural births is unnecessary: but on the other hand, there are some important points of practice, and some details as to the presentation and mortality in such cases, which require to be investigated. In this chapter, therefore, I shall chiefly remark upon the circumstances peculiar to plural births, and, to avoid repetitions, refer to the previous sections for the ordinary treatment.

A woman may conceive of two, three, four, or five children, but I am not aware of more than four children having been born alive at one birth.

The statistics I have been able to collect are not very extensive, but there are some interesting points which I have endeavored to investigate as fully as the means permit.

640. Statistics.—1. *Frequency.*

a. *British Practice.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
Dr. Jos. Clarke	10,307	184	3	1
Dr. Merriman	2,947	39	1	. .
Dr. Granville	640	9	. .	. .
Edinburgh Hospital	2,452	31	2	. .
Dublin Hospital	129,172	2,062	29	1
Dr. Maunsell	839	13	. .	. .
Mr. Gregory	691	12	. .	. .
Dr. Beatty	1,182	18	. .	. .
Dr. Lever	4,666	33	. .	. .
Dr. Reid	580	9	. .	. .
Mr. Warrington	110	3	. .	. .
Dr. Churchill	1,640	25	1	. .
Drs. M'Clintock and Hardy	6,634	95	1	. .
Dr. F. Ramsbotham	48,996	536	8	. .
Dr. Murphy	467	3	. .	. .
Dr. Storer	451	5	. .	. .
Mr. Crosse	1,394	17	. .	. .
Mr. Earle	4,320	58	. .	. .
Mr. Rose	600	10	. .	. .
Mr. Bailey	2,819	41	. .	. .
Mr. Waddington	2,159	19	1	. .
Dr. Toogood	1,135	12	. .	. .
Dr. J. Lee	850	9	. .	. .
Mr. K. Watson	800	18	. .	. .
Dr. Copeland	1,290	9	. .	. .
Dr. Adams	628	10	1	. .
Dr. Pagan	8,587	95	1	. .
Mr. R. U. West	2,106	23	. .	. .
Mr. J. Thompson	3,300	25	. .	. .
Drs. Johnston and Sinclair	13,748	233	1	. .
Dr. Hall Davis	7,302	69	. .	. .

b. *French Practice.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
Mad. Boivin	20.357	154	8	. .
Mad. Lachapelle	15,481	165	3	. .
Hôtel Dieu, Paris	280	4	. .	. .
M. Mazzoni	452	9	. .	. .
Dr. de Belli	2,789	34	. .	. .

c. *German Practice.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
Dr. Henne	1,214	1	. .	. .
Dr. Richter	2,571	52	. .	. .
Moschner and Kursak	12,329	165	. .	. .
A. E. v. Siebold	1,409	20	. .	. .
Dr. Riecke	219,303	2545	34	2
Dr. Klugè	809	15	. .	. .
Prof. André	176	5	. .	. .
Dr. Theys	55	4	. .	. .
Dr. Brunatti	99	2	. .	. .
Dr. Adelmann	56	1	. .	. .
Dr. Jansen	18,865	157	1	. .
Dr. Hoffman	6,139	98	. .	. .
Dr. Klein	35,084	325	. .	. .
Dr. Bartsch	4,383	42	. .	. .
Prof. Schwerer	21,804	250	1	. .
Dr. Arneth	6,527	81	. .	. .
Gebärklinik	39,121	445	3	. .
Wurtzburg Hospital	687	31	. .	. .

So far as these numbers go, we find among British practitioners, in 257,935 cases, 3431 cases of twins, or about 1 in 75; and 43 cases of triplets, or 1 in 5561½. Among the French practitioners, in 39,409 cases, 336 cases of twins, or about 1 in 108; and 6 of triplets, or 1 in 6568. Among German practitioners, in 369,080 cases, 4239 cases of twins, or about 1 in 87; and 38 of triplets, or about 1 in 9765. Taking the whole, we have 666,424 cases, and 8006 of twins, or 1 in 83; and 87 cases of triplets, or 1 in 7443.

I have formerly quoted the comparative frequency in different countries stated by M. Quetelet.

[Dr. E. Von Siebold gives[1] an account of the twin births which have occurred at the Göttingen Midwifery Institution since its establishment. These amount to 89 in number, occurring in 7139 births, which had taken place between the years 1792 and 1859 — making 1 twin case in every 80 births. According to Veit's statistics, the proportion in Prussia is 1 in 89; in Wirtemberg, 1 in 86; and in Saxony, 1 in 78. The proportion has been found to vary greatly in different towns. Kürschner in his Thesis sets it down as 1 in 158 at Naples, 1 in 126 at Palermo, 1 in 118 in Lünenburg, 1 in 110 at Marburg, 1 in 96 at Hamburg, 1 in 88 at Berlin, 1 in 86 at Leipzic, 1 in 85 at London, 1 in 84 at Paris, 1 in 74 at Vienna and Wurzburg, 1 in 68 at Dresden, 1 in 62 at Heidelberg, 1 in 72 at Prague, 1 in 75 at Philadelphia, 1 in 57 at Dublin.]

2. *Mortality.*

Authors.	Twin Cases.	Children lost.	Triplet Cases.	Children lost.
Mr. Giffard	14	9	1	. .
Dr. Smellie	8	2	2	. .
Mr. Perfect	7	7	. .	. .
Dr. Jos. Clarke	184	282	8	. .
Dr. Ramsbotham	15	9	2	4
Dr. Granville	9	4	. .	. .
Dr. Collins	240	58	4	4
Mr. Gregory	12	16	. .	. .
Dr. Beatty	18	8	. .	. .
Dr. Lever	33	6	. .	. .
Dr. Jansen	157	16	. .	. .
Drs. M'Clintock and Hardy	95	19	. .	. .
Dr. Arneth	81	8	. .	. .
Dr. Hoffman	98	38	. .	. .
Mr. J. Thompson	25	. .	. .	. .
Drs. Johnston and Sinclair	233	85	. .	. .
Dr. Hall Davis	69	9	. .	. .

Thus, out of 1298 cases of twins (*i. e.*, 2596 children), 636 were lost, or about 1 in 4; and out of 12 cases of triplets (*i. e.*, 36 children), 11 were lost, or 1 in 3.

This mortality, however, which is very large, must be qualified by allowing for the great number of children whose death could not be attributed to the labor. Dr. Jos. Clarke had 43 still-born; Dr. Collins had 54 premature labors among the twin cases, and 12 cases of the birth of a putrid fœtus. Drs. Johnston and Sinclair record 27 cases of putrid fœtus.

The mortality to the mother in twin cases has been computed as 1 in 20: in Dr. Collins' cases it was 1 in 34: in Drs. Johnston and Sinclair's it was 1 in 23. I regret that, from the imperfection of the records, I cannot give ample statistics on this point.

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[1] [Monatsschrift f. Gebürtskunde, Bd. xiii]

As to the sexes in twin cases, the following cases are recorded: —

Authors.	No. of Twin Cases.	Both Males.	Both Females.	One Male and one Female.
Dr. Jos. Clarke	184	47	68	71
Dr. Collins	240	78	67	97
Dr. Lever	83	11	11	11
Dr. F. Ramsbotham	536	171	188	182
Drs. M'Clintock and Hardy . .	95	38	22	35
Drs. Johnston and Sinclair . . .	238	76	58	99
	1,321	416	409	495

Thus we find that twin children are most frequently of opposite sexes, and that twin males are more common than twin females. From Dr. Collins' record, I may state, that of his twin male cases 23 were dead (1 putrid), and that of these 23, 13 were the first-born children; of the female twins, 11 were dead (4 putrid); and of the twins of opposite sexes, 22 were lost (7 putrid), of which 15 were boys and 7 girls. Drs. M'Clintock and Hardy state that "of the 190 children, 171 were born alive; viz., 85 first-born, and 86 second-born. Of the entire number of children, 111 were boys, of whom 58 were first-born, and 53 second-born; 79 were girls, of whom 37 were first-born, and 42 second-born; 101 boys were born alive, viz., 52 first-born, and 49 second-born; 70 girls were born alive; viz., 33 first-born, and 37 second-born; 10 boys were dead born, viz., 6 first-born, and 4 second-born; 9 girls were dead born, viz., 4 first-born, and 5 second-born; 5 of these females were putrid."[1] Of Drs. Johnston and Sinclair's 233 cases in 466 children, in 76 cases both were boys; 133 were born alive, 14 still-born, and 5 putrid; in 58 cases, both were females, 106 were born living, 6 dead, and 4 putrid. In 99 cases they were of opposite sex; 58 of the male children were alive, 9 dead, and 5 putrid; 89 of the girls were alive, 6 dead, and 4 putrid.[2] This is important, since from it we learn that there is more danger to the boys than the girls, and particularly when there are twin cases of opposite sexes.

From the reports of the same authors, the presentations, placed in order of births, were as follows: —

Authors.	Both Head.	Head and Breech.	Head and Foot.	Both Breech.	Breech and Head.	Breech and Foot.	Both Foot-ling.
Dr. J. Clarke	16	. .	25	2	6	1	3
Dr. Collins	103	30	25	8	25	9	5
Dr. Lever	15	7	5	2	. .	1	. .
Drs. Johnston and Sinclair .	125	44	. .	19	26	. .	. .

Authors.	Foot and Head.	Breech and Elbow.	Head and Arm or Shoulder.	Face and Head.	Head and Face.	Foot and Hand.	Foot and Breech.
Dr. J Clarke	10	. .	. .	. .	. .	. .	. .
Dr. Collins	19	1	5	1	1	1	1
Dr. Lever	. .	. .	2	. .	. .	. .	. .
Drs. Johnston and Sinclair .	. .	9	10	. .	. .	. .	. .

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[1] On Midwifery and Puerperal Diseases, p. 239.

[2] Practical Midwifery, pp. 273–4.

Dr. Collins thus states the mortality of his different presentations: when both were head presentations, he lost 24 (4 putrid), when the head and breech (*i. e.*, the first child with the head, and the second with the breech) presented, 2 of the former and 5 of the latter were lost; when the head and feet, 2 of the former and 3 of the latter; when the feet and head, 4 of the former and 2 of the latter; when the breech and the head, 1 of the former and 6 of the latter; when both were footling cases, 2 were lost; when the breech and feet, 3 of the former and 2 of the latter were lost.

This confirms what I have elsewhere stated, that the less the passages are dilated by the presenting part, the greater the mortality amongst the children, because of the delay in the transit of the remaining parts of the body of the child.

[According to Von Siebold,[1] in a series of 35 cases of twins attended by Osiander between the years 1792 and 1822, the head presented in both children 19 times, the head and breech 6 times, the head and feet 4 times, the breech and feet, twice. In one case the feet presented in both children, and in another case, the breech. In one case, one child presented the head and the other the shoulder, and in one case the position was not accurately ascertained.

In the 35 cases — 70 children, 28 were delivered without interference, the remaining 42 being removed by the forceps, turning, or extraction by the feet.

In a series of 54 cases of twins attended by Von Siebold himself, in conjunction with Mende, between the years 1823 and 1859, the head presented in both children 22 times, the head and breech 11 times, the head and feet 10 times, the head and shoulders 5 times, breech of both children twice, breech and feet twice, the feet once, the breech and shoulder once.

Of the 108 children born in these 54 cases, 83 were delivered without interference, and 25 by the forceps, turning, or extraction by the feet.

In 87 of the entire number of cases, 2 boys were born in 28, 2 girls in 17, and a boy and girl in 42; there being 99 boys and 77 girls in 178 children.]

Dr. Simpson has investigated the subject of the alleged infecundity of the female in twin births of males and females. He concludes "1. That in the human subject, females born co-twin with males are, when married, as likely to have children as any other females belonging to the general community. 2. That when they are married and become mothers, they are, in respect to the number of their children, as productive as other females. 3. That the same law of fecundity of the female in opposite-sexed twins seems to hold good among all our uniparous domestic animals, with the exception of the cow alone."[2]

641. SYMPTOMS. — The first, second, or third child may present naturally or unnaturally, and in that respect the course of the labor will resemble that of similar cases with single children. But it is generally remarkable that the progress of the first child is slower than we should have expected; for, on examination, there appears no want of space, and the pains may be strong. This I suppose arises from the pressure of the entire uterus not bearing directly upon the child which is to pass first, but at least as much and primarily upon the second child. The pressure upon the second child causes it to press down the first child; but in this transmission of force much power is necessarily lost, and thus it is that we find very gradual progress in these cases, notwithstanding that the pains are good and the space ample. When the first child is born, whatever suspicions may have been previously entertained are changed into certainty, unless in the case of a small blighted fœtus; for, upon placing the hand upon the abdomen, the uterus is felt nearly as large as at first, and the child may be detected through its parietes.

After the birth of the first child, there is an interval of rest, varying from ten minutes to some hours; nay, instances are on record of days and weeks intervening before the birth of the second child. Of 212 cases related by Dr. Collins, in which the interval is accurately marked, in 38 it was 5 minutes; in 29, 10 minutes; in 45, 15 minutes; in 23, 20 minutes; in 30, half an hour; in 5, three quarters of an hour; in 16, 1 hour; in 8, 2 hours; in 3, 3 hours; in 5, 4 hours; in 1, 4½ hours; in 3, 5 hours; in 2, 6 hours; in 1, 7 hours; in 1, 8 hours; in 1, 10 hours; and in 1, 20 hours. Thus in by far the larger number the uterine action was resumed within half an hour. Dr. Merriman refers to three remarkable cases: in one the second child was retained fourteen days after the first; in the second, it was retained six weeks; in the third case, the woman was delivered of twins, and two days afterwards of two more boys. Drs. M'Clintock and Hardy have noted that in 3 cases the interval was 5 minutes; in 9, 10 minutes; in 10, 15; in 11, 20; in 2, 25; in 13, 30; in 1, 40 minutes; in 4, 1 hour; in 3, 1½; in 1, 2; and in 1, 2½ hours. Drs. Johnston and Sinclair found that the average duration of labor when both twins were males was 10⅓ hours, and for primiparæ 14½ hours; when both were female, 9⅘ hours, in primiparæ, 14 hours; when male and female, a little more than 12 hours, with primiparæ, nearly 23½ hours.

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[1] [Opera citat.]

[2] Edinburgh Med. and Surg. Journal, No. 158.

After this interval, whatever it may be, the pains return; and if there be nothing unusual on the part of the child, the labor is completed in less time than with the first child, because of the previous dilatation of the passages. For the same reason, when the second child presents with the breech or foot, the mortality is less than usual. Dr. Denman remarks, "the most fortunate presentation of the second child in a twin case is certainly with the inferior extremities, because it may in this position be extracted without injury or difficulty, and if assistance be required, this may be given with safety and convenience."

There is one important point to be borne in mind—viz., that the more quickly the two labors succeed each other, and the more rapidly they are terminated, the more probability there is of collapse afterwards, whether there be hemorrhage or not. I have seen a lady placed in very great peril from this cause, without any unusual loss. I rather think, also, that there is more danger of hemorrhage, but of that I am not quite certain. On this account the medical attendant should not leave the patient for some time after all is over.

642. Treatment.—Whether the first child present with the head or any other part, it is to be treated exactly according to the rules heretofore laid down, just as if it were a single birth; and so, as far as the labor is concerned, must the second child; thus, if the first be a natural labor and the second a mal-presentation, we need not interfere with the first, but assistance may be necessary with the last child; or the first may be a mal-presentation requiring assistance, and the second a natural labor needing none. For the reason already stated, viz., the diminution of direct uterine force, it occasionally happens that the first child has to be delivered by the forceps. The rules laid down for the employment of that instrument apply equally to these cases, but it is even more necessary that no undue delay should take place.

So far we must act according to the nature of the case. But suppose that the uterus do not resume its action after the ordinary interval, are we still to leave all to nature? It is clear that, if the passages be allowed to recover from the former distension, there will be more trouble with the second child, especially if it be a mal-presentation; and that there must be a risk of hemorrhage so long as the uterus remains uncontracted; and it would seem that delay involves danger to the second child. For these among other reasons, opinions have varied as to the necessity of interference, and as usual, the practice has ranged from one extreme to the other; some having advised instant delivery to obviate these dangers, and others, finding that in many cases left to nature no evil has followed, recommending that we should abstain from all interference. Dr. Denman advises us to wait for four hours, "if there be no cause for delivery sooner." Dr. Ramsbotham two or three hours, Dr. Burns about an hour. Dr. F. Ramsbotham agrees with Denman. Dr. Campbell suggests that ergot should be given before we attempt to extract the child. The rules laid down by Dr. Collins appear to me extremely judicious; he advises a middle course, "as soon as the first child is born, a binder should be applied so as to make gentle pressure upon the abdomen; we should not leave the house until the second child is delivered. If we find, after the lapse of half an hour, that the membranes of the second child still remain unbroken, they may be punctured with advantage, with the view of exciting uterine action, as the soft parts having been so well dilated by the passage of the first, no bad result can ensue. This expedient in some instances will be found not to succeed; and in such cases, when we do not observe any progress made in the course of two hours after rupturing the membranes, the best mode of proceeding will be to pass the hand cautiously into the uterus, and bring down the feet. There will be but little difficulty experienced in this operation, the parts being in so relaxed a state. When the head has made any considerable descent into the pelvis, the forceps will be the best means of affording assistance. It is very rarely, however, that we are called upon to effect delivery by either of the latter methods; yet experience has shown that the second child is very likely to be still-born if left longer than two or three hours unassisted."

There are circumstances, as Dr. Merriman has justly observed, which would negative any delay in the delivery of the second child: as, for example, 1, when artificial aid has been required with the first child; 2, when the second child presents preternaturally; and 3, when the labor is complicated with convulsions, hemorrhage, etc.

Any deviation from normal labor with the second child is to be treated according to the rules laid down, without regard to its being a twin case.

643. With regard to the placenta of the first child; unless it come away quite easily, I believe that in all cases it is better to leave it until after the birth of the second child, as its removal might excite uncontrollable flooding. After the birth of the second (or third) child, the binder is to be tightened, and pressure or friction made upon the uterus, and when we find it disposed to contract, then we may draw down (in the axis of the upper outlet) first one cord, and if that do not yield, the other, or both together, so as to aid in the expulsion. But it must be remembered that, after the delivery of plural children, the uterus is less disposed to renew its exertions, and therefore a longer interval must be allowed: and that by the detachment of the placenta a much larger surface of bleeding vessels will be exposed, and therefore, that we should avoid their forcible separation by traction, and should be particularly careful to secure the due and permanent contraction of the uterus afterwards. It will probably be safer and wiser in these cases to give a moderate dose (ʒss.) of the ergot of rye immediately after the birth of the last child. "In twin cases," Dr. Collins observes, "when it becomes necessary to remove the placenta, we should be careful not to withdraw our hand from the uterus, until both be separated, at the same time waiting for uterine action, so as to induce as perfect a contraction of this organ as practicable: *a point of most vital importance.*" The shock to the nervous system is generally greater than after natural labor, and in some cases it is very severe, amounting to collapse, as in the case I have mentioned: this will justify the exhibition of stimulants and opium, and it demands extreme quiet and care.

The management of twin cases applies equally to triplet and quadruplet cases; especially the care recommended as to the placenta.

Dr. Denman states that "it is a constant rule to keep patients, who have borne one child, ignorant of there being another, as long as it can possibly be done." There is certainly no occasion to frighten the patient by an abrupt communication; but, on the other hand, I do believe that concealments are bad, and that in midwifery, as everywhere else, "honesty is the best policy;" besides, the patient is almost certain to suspect the state of the case, and to inquire concerning it. I think, with Dr. F. Ramsbotham, that in all cases "it is better neither to inform her abruptly of the nature of the case, nor to make any mystery about it; but certainly to tell her that she will soon give birth to a second; and this may be coupled with a congratulation on the fortunate progress of the labor so far; and an assurance that she will have but little more pain to bear, and that the case presents no features calling for anxiety."

644. I have hitherto spoken of twin cases in which one of the children only presented; but it has occasionally happened that both bags of membranes have ruptured, and an extremity of different children descended, at the same time. Thus, the late Dr. Fergusson, of this city, has published a case in which the head of one child and the foot of another presented together. The midwife drew down the leg, and so jammed the head and breech in the pelvis together. However, the pains being powerful, expelled the natural presentation first, and the other afterwards. A similar case is recorded by Mr. Alexander,[1] and Mr. Allen relates one[2] in which the two heads occupied the pelvis together; and both were naturally expelled. Dr. Murphy[3] mentions a case in which the heads of twins were jammed in the pelvis together; and my friend, Dr. Christie, of Aberdeen, has related to me a similar case, in which the feet of the first child presented, but the head of the second descended into the pelvis in advance of the head of the first. He succeeded, by pushing up the head of the first child, in liberating and pushing back the head of the second, after which the labor was speedily terminated. Dr. F. Ramsbotham mentions having been called to a case when a right and a left foot belonging to different children presented; he pushed up one and extracted by the other, and both children were born living.

Such cases are no doubt very puzzling at first, and may excite some anxiety as to the result; but it may be remarked, that the descent of a foot with the head proves that the pelvis is unusually large, and in all the cases it appears that the pains were very powerful. It would, therefore, be right, if we could not push up one of the presenting parts, to give fair play to the natural powers, and only upon conviction of their inefficiency to lessen the bulk of one child. If the head of the footling case were within reach, it would be better to operate upon it, as the child's life will have already been compromised by the pressure upon the cord, whilst the other child has incurred little or no danger. In such a case as Dr. F. Ramsbotham's, we must of course adopt a similar line of practice, pushing up one leg and drawing down the other, until the breech be engaged in the upper outlet.

645. II. MONSTERS. — All that is obstetrically important relating to this subject may be comprised in a few words. As far as we are concerned, we may divide all these deviations from normal formation into monstrosities by defect and excess, those from disease, and the cases where two children are conjoined. The only practical point involved is their relation in size to the pelvis; consequently with those by defect we have nothing to do, as there is no difficulty in their transit through the pelvis. Monsters from excessive development of different parts likewise come under the class of which we are treating, just so far as their bulk is rendered disproportionate to the pelvis.

646. The principal diseases which render the child disproportionate to the passages are *hydrocephalus* and *ascites*. Neither are very uncommon,

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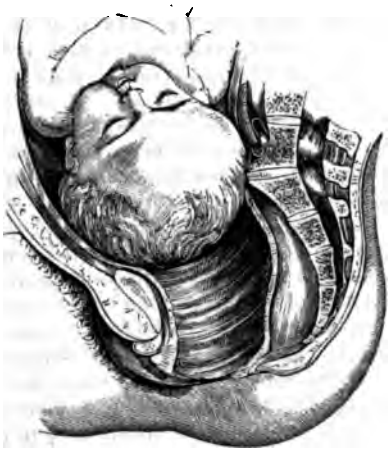
[1] Edin. Med. and Surg. Journal, 1822.

[2] Med.-Chir. Trans., vol. xii

[3] Lectures on Parturition, etc., p. 274.

and most practitioners must have met with cases of them. When a child affected with hydrocephalus presents at the brim, the entrance may be effected with difficulty, or it may be quite impossible: the head being nearly incompressible. On examination, therefore, we find that, notwithstanding good pains, in well-marked cases, the head does not even dip into the pelvis; that no advance whatever is made by the uterine pressure (fig. 173). The head feels full and tense during a pain, but during an interval the fluid gives way under the point of the finger. The bones of the head are unconnected, and give the impression of being loose in the scalp. If the labor were left to nature, we should, after due time, have all the bad symptoms of a prolonged second stage. The diagnosis is obscure: if we ascertain the pelvis to be of the usual size, and still find that the great bulk of the head is above the brim, and cannot descend, the case is clearly one of great disproportion, and it is equally plain that the excess is on the part of the child; in such circumstances, if the bones are loose and the head flaccid during an interval, it will be fair to suppose the case one of hydrocephalus, especially if we find the pulsations of the fœtal heart have ceased.

Fig. 173.



Hydrocephalus.

I need not say that the diagnosis will be much more difficult if the feet present, although the same principles of treatment apply equally, first having established the impractibility of delivery, from relative disproportion.

647. In *ascites*, there is much less obscurity, the head having been expelled, it is easy to see that the difficulty arises from the distention of the abdomen of the child, and a careful examination will, in most cases, distinguish between ascites and tympanites. In the latter case, the air is seldom limited to the abdomen, but the face and chest will be found more or less puffed.[1]

M. Depaul has published a memoir upon *distention of the fœtal bladder*, as an impediment which he seems to think more common than simple ascites. He recommends puncture of the bladder through the abdominal parietes as the only remedy, and after birth an attempt to remedy the original defect which occasioned the retention.[2] A case of difficult labor from enormous enlargement of the kidneys is on record,[3] but as far as I know, it is the only one.

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[1] Ed. Med. and Surg. Journal, vol. xvii. p. 561.

[2] Ranking's Abstract vol. ii., 266, from L'Union Médicale.

[3] British and Foreign Med. Chir. Review, Oct. 1856, p. 557.

648. *Double monsters* are very rare, and may create great difficulty in the delivery, although there are cases on record of the children having been born alive. Dr. Burns quotes several such: "In the seventh volume of the Nouv. Journ. p. 164," he says, "is a case where two children were born at the full time, united by the inferior part of the belly, from the centre of which came the cord. The vertebral columns almost touched at the lower part. The two children, who were of different sexes, lived, we are told, twelve days, but nothing is said of the labor. In the Bulletin for 1818, p. 2, two children, who were joined by the back of the sacrum, are stated to have been born, and lived till the ninth day. The first child presented the head, but the midwife could not well tell how the second got out. There is another case, at page 32, of a woman who, after many days of labor, bore a monster double in its upper parts. The spinal column was united from the sacrum to the top of the dorsal vertebræ, then the cervical vertebræ divided to form two necks. The midwife finding the head to present along with the cord and a hand, tried to turn, but could discover nothing but superior extremities. She therefore let her alone. The head was afterwards expelled, but neither nature nor art could deliver the body. M. Ratel finding the head and two arms almost separated from the body, cut these parts off, then introducing his hand, he found another head, turned the child, and brought away the whole mass.

There is a skeleton in the Royal College of Surgeons of Ireland of a double monster, the children being joined by the lower part of the sacrum, and I believe they were also born alive. The Siamese twins are another instance of the kind; and two similarly joined were in the possession of the late Dr. Montgomery.

649. Treatment. — I have already stated the general principle by which we are to be governed in all these cases. Whenever the monstrosity adds so much to the bulk of the child as to render the delivery impracticable by the natural powers alone, or assisted by the forceps, we must lessen the bulk.

In cases of hydrocephalus there need be no hesitation, if the head be not too large to pass; no interference is required whether the child be alive or dead; but if it be so large that it cannot pass, we have no choice but to perforate. In the majority of cases the child is dead before the operation. The ground of the operation is the mechanical impediment to delivery, and the death of the child will justify an early interference. The operation is very easy; but should the operator not have suspected hydrocephalus, but disproportion from another cause, the sudden rush of water may alarm him lest he should have perforated the bladder. In footling cases the head must be perforated behind the ears.

When the body cannot be extracted, owing to the distention by air or water, relief may be afforded by plunging the perforator into the body.

As to the double monstrosity, Dr. Burns remarks very truly: "The general principle of conduct must be, that, when the impediment is very great, and does not yield to such force as can be safely exerted by pulling that part which is protruded, a separation must be made, generally of that part which is protruded, and the child afterwards turned, if necessary. Unless the pelvis be greatly deformed, it will be practicable to deliver even a double child by means of perforation of the cavities, or such separation as may be expedient, and the use of the hand, forceps, or crotchet, according to circumstances. A great degree of deformity may render the Cæsarian operation necessary."

I may add, as a caution to my junior readers, that the destruction of a monster *after* birth (no matter how great the deformity) is punishable as infanticide.

CHAPTER XVIII.

PARTURITION.—CLASS III. COMPLEX LABOR.

ORDER 1. PROLAPSE OF THE FUNIS UMBILICALIS.

650. Having fully considered natural labor where the agents or elements of parturition are equally balanced; and unnatural labor, where the abnormal deviation is dependent upon some deficiency or irregularity in the power, the passages, or the child, we shall now pass on to the third class, or complex labor, of which, as I observed before, the characteristic peculiarity is not anything in the mechanism of labor, but consists in some accidental complication. The labor itself may be natural or unnatural, but more frequently the former than the latter: however, with the consideration of the labor (except as connected with the complication) we have nothing to do.

Prolapse of the Funis Umbilicalis. — The first complication I shall describe is *prolapse of the funis*, either alone or along with the presenting part; and occurring either at the commencement or during the course of the labor.

This accident has no influence whatever upon the progress of the labor; but a very serious one upon the life of the child, and any interference which may be advised is for the purpose of rescuing it from peril.

651. Statistics. — We may form some idea of the frequency of its occurrence, and of the result to the child, from the following table: —

1. *Frequency.*

British Practice.			*French Practice.*		
Authors.	Total No. of Cases.	Prolapse of Funis.	Authors.	Total No. of Cases.	Prolapse of Funis.
Dr. Bland . .	1,897	1	Mad. Boivin . .	20,357	39
Dr. Jos. Clarke .	10,387	66	Mad. Lachapelle .	15,652	41
Dr. Merriman .	2,947	8	M. Mazzoni . .	452	18
Dr. Granville . .	640	1			
Ed. Lying-in-Hosp.	2,452	3			
Dr. Collins . .	16,414	97	*German Practice.*		
Dr. Cusack . .	398	5			
Dr. Maunsell . .	839	2			
Mr. Gregory . .	691	7	M. Richter . .	624	4
Dr. Beatty . .	1,182	6	A. E. v. Siebold .	492	2
Dr. Lever . .	4,666	6	Dr. Voigtel . .	29	1
Dr. Reid . .	3,250	16	Dr. Jansen . .	13,369	86
Mr. French . .	89	1	M. Bartsch . .	4,425	16
Dr. Churchill . .	1,625	7	M. Klein . .	5,490	55
Drs. M'Clintock and Hardy .	6,634	87	Dr. Arneth . .	6,608	83
Dr. Bliss . .	771	1			
Dr. Metcalf . .	800	2			
Mr. Rose . .	600	2			
Mr. Bailey . .	2,819	9			
Dr. J. Lee . .	850	2			
Dr. Copeland . .	1,290	5			
Mr. J. Thompson .	3,300	8			
Drs. Johnston and Sinclair	13,748	98			
Dr. Hall Davis .	7,302	19			

Thus, in British practice it occurred 404 times in 84,991 cases, or about 1 in 210⅓; in French practice, 98 times in 36.546 cases, or about 1 in 373; and in German practice, 197 times in 31,037 cases, or about 1 in 162⅔. Taking the whole together, we have 152,574 cases, and 699 examples of prolapsed funis, or about 1 in 218.

The risk to the child may be estimated from the following table: —

2. *Mortality.*

Authors.	Cases of Prolapse.	Children lost.	Cord replaced	Delivered by		
				Nat.	Version.	Forceps.
Mr. Giffard	21	17	2	. .	15	5
Dr. Smellie	6	2	. .	. .	5	. .
Mr. Perfect	4	3	. .	. .	4	. .
Dr. Jos. Clarke . . .	66	49	. .	. .	. .	. .
Dr. Merriman	8	4	. .	. .	. .	. .
Dr. Ramsbotham . . .	1	1	. .	. .	1	. .
Dr. Collins	97	78	. .	. .	. .	. .
Dr. Cusack	5	5	. .	. .	. .	. .
Mr. Gregory	7	4	. .	. .	. .	. .
Dr. Beatty	6	4	. .	. .	. .	. .
Mr. Lever	6	2	. .	. .	. .	. .
Dr. Churchill	7	5	. .	. .	. .	. .
Mr. J. Thompson . . .	8	2	. .	. .	. .	. .
Drs. Johnson and Sinclair .	98	42	. .	61	16	9
Dr. Hall Davis	19	9	. .	. .	4	. .
Mad. Boivin	39	9	. .	. .	26	13
Mad. Lachapelle . . .	41	7	14	1	12	18
Dr. Voitgel	1	. .	. .	. .	1	. .
Dr. Jansen	86	38	. .	. .	46	6
Drs. M'Clintock and Hardy .	37	25	5	6	. .	. .
Mr. Roberton	22	15	. .	. .	. .	. .
Dr. Metcalf	2	2	. .	. .	. .	. .
Dr. Bartsch	16	4	5	. .	2	3
Dr. Klein	55	20	27	. .	. .	2
Dr. Arneth	33	11	11	. .	. .	9

Here we find that out of 722 cases of prolapse, 375 children were lost, or more than one-half; a larger mortality than we find in any other order of practicable labor.

It must always be remembered, when speaking of the results of this accident to the child, that in lying-in hospitals many of the cases do not seek admission till some time after the occurrence, when the chance of a safe delivery is diminished; and some not until the cord has ceased to pulsate. Twenty-two such cases occurred out of the seventy-three unfavorable ones Dr. Collins has recorded; in eleven of Drs. M'Clintock and Hardy's, and twenty-one in Drs. Johnston and Sinclair's report.

652. CAUSES.—Many circumstances have been assigned as likely to *cause* or to *favor* the occurrence of this complication.

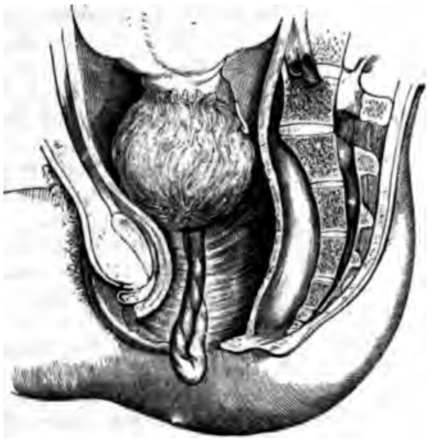
1. *Mal-position of the child.* —Smellie, in his plate of this accident, has represented the child lying across the uterus, with the umbilicus at the upper outlet, and the cord hanging down in the cavity of the pelvis; and Froriep regards this as an exact explanation. After a careful examination of the cases I have seen, and a tolerably extensive investigation into those recorded by authors, I can find few, if any, facts in support of this view, and must, therefore, attribute the explanation rather to Smellie's ingenuity than to his observation.

2. It would appear that a *small* child with a *large quantity* of the *liquor*

amnii, by allowing the head of the fœtus to move away from the brim of the pelvis during the latter months, will favor the escape of a loop of the funis.

3. The *sudden rupture* of the membranes, and the *forcible rush* of a large quantity of the *liquor amnii*, may have a similar effect, and especially when aided by an untoward position in the mother, as occurred to a patient of mine who was standing up when the membranes suddenly ruptured.

Fig. 174.



Prolapse of the Funis.

4. It will be favored by a *presentation of the feet or knees*, as they do not fill up the upper outlet; and even where the cord does not descend at the commencement of labor, it may before the breech enters the pelvis. In short, if the presenting part do not block up the os uteri, the cord, being specifically heavier than the liquor amnii, will be apt to prolapse, as Mr. Roberton has observed.[1] M. Naegelè is not correct, however, in stating that it occurs most frequently in footling cases.

5. M. Naegelè adds *irregular shape*, or *irregular action of the uterus*, as an occasional cause.

6. *Excessive length* of cord forms undoubtedly an important element; but it requires other conditions also, since in the cases of cords of from thirty-six to fifty four inches long, which I have noticed, no prolapse occurred.

7. I may state, from my own observation, that I have found, in several cases of prolapse, that the *placenta* was situated *low down* near the cervix uteri, and, in some few others, that the *funis was inserted into the lower edge* of the placenta.

There are cases, however, which are not attributable to any of these causes.

I have already mentioned a case in which prolapse was prevented by the coiling of the cord round the neck of the child.

653. In all cases of prolapsed funis, the child is in the utmost danger from the moment the upper strait of the pelvis is filled by the part of the child descending, in consequence of the pressure upon the cord, just as in footling cases. The effects of this pressure are in proportion to the time it is continued, if the cord be not partially shielded from it by its situation.

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[1] Phys. and Dis. of Women and Mid., p. 339.

There are but few cases in which the child escapes safely when the labor is left to the natural powers. In those in which I have seen this happy result, the pelvis was very large, the child of a moderate size, and the pains very violent, so that the second stage of labor occupied but a very short space of time. The same result will obtain in those cases where the cord is shielded from pressure by being lodged in the angle at the junction of the sacrum and ilium. The chances will be still greater, if the patient have previously borne five or six children.

654. TREATMENT.—The means to be adopted will depend entirely upon the state of the prolapsed cord. Should it exhibit marks of putrefaction, or be without pulsation, it will be useless to interfere, because hopeless as regards the life of the infant, and the labor may be allowed to terminate naturally, or be terminated by craniotomy if there be any undue delay. Capuron advises us not to interfere at once, even though the cord should pulsate, but rather to wait until the pulsations become feeble. It will certainly be desirable that the os uteri should be as much dilated as possible; and if we discover the prolapsed cord before the rupture of the membranes, it will be well to postpone their rupture until that object be effected.

Various modes of management have been proposed.

1. We are advised to push the cord upwards, beyond the brim of the pelvis, and there to retain it with one or two fingers, until the upper outlet be filled by the descending head. This would seem easy and certain, but in practice it is not so; for the pains which force down the head, force down the cord also; and besides, there is some risk of displacing the head. This re-position is still more difficult, if any other part than the head present. On the whole, I believe I may say that it rarely succeeds. Dr. Arneth states, that in the Vienna Hospital, the funis was generally carried over and beyond the head of the child, and lodged in the hollow of the neck; and that of forty cases in his own practice and that of Klein and Bartsch in which this plan was adopted, thirty-eight of the children were born alive.[1]

2. It has been proposed to return the cord, and to hook it over the limbs of the child. This may also succeed, but it is a very difficult and a somewhat dangerous operation; and I am inclined to agree with Dr. Burns, that "if the hand is to be introduced so far, it is better at once to turn the child."[2] It is but right to add, that Sir R. Croft succeeded twice in this way.[3]

3. Various mechanical expedients have been contrived for retaining the cord when replaced. Thus, enclosing the cord in a leathern bag, and pushing it beyond the head of the child, was recommended by Mackenzie;[4] attaching the cord to the extremity of a canula, by Ducamp; or of a catheter, by Dudan;[5] the reductor, by Aitken; a thin elastic flat rod of steel, by Dr. D. Davis;[6] and a modification of some of these contrivances was suggested by Champion, Favereau, and Guillon.[7] Dr. Harris, of Philadelphia, returned the cord above the knees in a breech presentation, and the child was saved.

4. Osiander, Busch, Hogben, and Hopkins, propose to retain the cord by introducing a piece of sponge after its replacement.

5. Dr. S. Merriman has twice succeeded in saving the infant, not by returning the cord, but by placing it in the angle formed by the junction of the sacrum and ilium, where it is in a great measure shielded from pressure.

["Many various methods of repositing the cord, or putting it back into the womb, above the fœtal head," remarks Dr. Meigs,[8] "have been proposed; they have mostly been found ineffectual, the cord being apt to fall down again, even after it had been put into the proper place. I have never yet had an opportunity to try a method which I beg leave to propose to my readers, and which is as follows: Take a piece of riband or tape, a quarter of an inch wide and four or five inches long. Half an inch from the end, fold the tape back, and sew the edges so as to make a small pocket. Then fold the other end in the opposite direction, and sew that also, to make a pocket of it. Now if the cord be taken in the tape, and held as in a sling, a catheter may be pushed into one of the pockets, and that one thrust into the other, so that we shall have the cord held as in a sling, which is itself supported on the end of the catheter or womb-sound. Let the catheter be now pushed up into the womb, beyond the fœtal head; it will carry the secured portion of cord with it, and the catheter being withdrawn, the tape is left in the uterine cavity, where no harm can be occasioned by its presence. If required, several such tapes could be secured round the cord, and all of them fixed on the end of the same catheter, and pushed at the same moment far up within the cavity of the womb."]

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[1] Die Geburtshülfliche Praxis, etc., p. 188.

[2] Principles of Midwifery, p. 488.

[3] Merriman's Synopsis, p. 99.

[4] Merriman, p. 99.

[5] Revue Méd., 1828, vol. iii. p. 502.

[6] Elements of Operative Midwifery, 1825. p. 170.

[7] Velpeau, Traité des Accouchemens, p. 842. Ed. Brux.

[8] [Obstetrics; the Science and the Art, 2d ed.]

If we determine to try the preceding plans, or if the advance of the head preclude any attempt at re-position, or, lastly, if the cord come down during labor, we may increase the chances of safety by applying the forceps and hastening delivery, as soon as the head is within reach.

6. Dr. Gaillard Thomas, of New York, has proposed a modification in the re-position of the funis, so simple and so in accordance with common sense, that one only wonders that none of us ever thought of it before.[1] He recommends that the woman should be placed on her hands and knees, so as to reverse the inclined plane formed by the cavity of the uterus and pelvis; and to have in our favor the influence of gravitation. In this position, if the membranes be not broken, it is possible that the loop of the cord may slip above the head spontaneously. If the cord have descended, the hand is to be introduced into the vagina, and the cord passed above the head, and the same position to be maintained for a few pains. In two cases in which he tried it, no part returned prolapsed, and the head coming forward, he had no further trouble with the cord.

7. If the patient have had children before, and if the pelvis be roomy, and the soft parts well dilated, perhaps the best chance for the child is in turning, particularly if there should be a mal-presentation. But as this operation is not without hazard to the mother, we should accurately estimate the favorable or unfavorable probabilities as regards the child, before we attempt it. Dr. M'Clintock has recently showed that while more children are saved by this than by any other method, the risk to the mother is not so great as has been supposed.

Madame Boivin turned the child in 25 cases, and used the forceps in 13 out of the 38 cases she has recorded, and saved 29 children. Madame Lachapelle, in 23 cases, used the forceps 13 times, and version 10; 17 children were saved. In one case, Dr. Collins saved the child by returning the cord, and retaining it by the hand in the vagina; in another, by enclosing it in a linen bag, returning it, and retaining it there by introducing a piece of sponge.

Should the delivery have been completed within a short time after the cord has ceased to pulsate, it will be our duty to employ for some time the usual means for resuscitating the child; so long as the heart beats ever so faintly, there is hope.

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[1] Transactions of the New York Academy of Medicine, vol. ii. part 2, p. 21.

CHAPTER XIX.

PARTURITION.—CLASS III. COMPLEX LABOR.
ORDER 2. RETENTION OF THE PLACENTA.

655. In the definition of natural labor I included the expulsion of the placenta "in due time;" and when speaking of the third stage I mentioned that Dr. Clarke found the average interval between the birth of the child and expulsion of the after-birth was twenty minutes; and that out of 654 cases observed by myself, in 622 it was expelled within a quarter of an hour; from these data I remarked, "we may conclude with the highest authorities, that in natural labor the placenta ought to be expelled within an hour or an hour and a half, and that when the interval exceeds this, the case fairly comes under the order of 'retained placenta.'"

There is, however, an exception to the stringent application of this rule, and that is when, from the length of the labor or its abnormal character, the uterus has been over fatigued, so that it does not so soon resume its contractions. There is no reason to suppose the uterus exempted from fatigue in proportion to its exertions, any more than any muscle of the body; and when it has been so fatigued, we do not find that it requires and takes a longer interval of rest than usual, and that after this has elapsed, it contracts again, and expels the remaining contents. In estimating the interval which ought to elapse before we interfere, we must, therefore, take into consideration the peculiar kind of labor and probable amount of fatigue, and allow a certain variation accordingly.

Some writers have recommended that the placenta should never be extracted except in case of hemorrhage; but it was found, that if left to nature, it was occasionally retained until it putrefied and excited uterine inflammation; for this reason, others recommended its immediate extraction; but the truth appears to lie between the two extremes. We do not interfere when the uterus is adequate to the expulsion, but when we are convinced that its efforts are suspended or inadequate, we extract it to avoid the risk of hemorrhage or inflamation of the uterus.

[Much,—almost all the difficulty which occurs in respect to the delivery of the placenta in cases of natural labor, originates, we are persuaded, from mismanagement — either the improper administration of ergot with the view to accelerate labor, hurrying the birth of the shoulder and trunk, by manual interference, after the expulsion of the head, or the neglecting to secure the prompt and regular contraction of the uterus, and the early removal of the placenta lying loose in its cavity, subsequent to the birth of the child. The common direction to wait, after the child is born, from an hour to an hour and a half, for the spontaneous expulsion of the placenta, before any attempt is made to remove it, has been productive of no little mischief. With Dr. Meigs, we believe that there cannot and ought not to be adopted any fixed rule in respect to the period that should elapse before proper measures are taken to secure the extrusion of the placenta from the womb. The only thing to be kept in mind is that the placenta must be got rid of at as early a period as practicable, there being no security for the patient while it remains. There is no good reason why, after the child is born, the practitioner should wait patiently for a renewal of labor pains in order that the expulsion of the placenta may be effected. His chief care should be to have the uterus rid of the latter as early as this can be effected with a due regard to the safety of the mother, in order that prompt, regular, and permanent contraction of the organ may take place. If within a reasonable time, under the diligent employment of abdominal frictions and gentle pressure, the placenta is not expelled from the uterus, the practitioner has then good reason for concluding that its retention is caused by something unusual, and should at once proceed to ascertain its exact nature, in order that the proper means may be employed to overcome it.]

656. Definition.—I would, therefore, define cases of retained placenta to be those in which the uterus does not, after a due interval of rest, detach or expel the placenta, and which, consequently, require to be extracted. This interval may be fixed at an hour or thereabouts, for ordinary cases; but, on the one hand, more time may be required if the fatigue have been excessive, and, on the other, prompt interference will be necessary if hemorrhage supervene.

657. Statistics. — The following table will enable us to estimate its frequency, causes, and, in some measure, its consequences.

Authors.	Total No. of Cases.	Retained Placenta.	Inertia.	Irregular Contractions.	Morbid Adhesion.	Mothers lost.
Mr. Giffard	. .	24	3	7	11	3
Mr. Perfect	. .	19	2	14	3	4
Dr. Jos. Clarke	10,887	21	. .	5	. .	5
Dr. Ramsbotham	. .	27	2	1	24	10
Dr. Granville	640	7	. .	. .	. .	. .
Edin. Hospital	2.452	6	. .	. .	. .	6
Dr. Cusack	701	22	. .	5	. .	1
Dr. Maunsell	416	2	. .	. .	. .	. .
Dr. Collins	16,414	66	37	19	10	6
Dr. Reid	3,250	32	. .	. .	. .	. .
Dr. Beatty	783	1	1	. .	. .	1
Dr. Lever	4,666	87	22	. .	15	. .
Dr. F. H. Ramsbotham	68,435	403	1	. .	. .	. .
Dr. Toogood	1,135	24	. .	. .	. .	. .
Dr. Lee	850	5	. .	. .	5	. .
M. Riecke	219,303	.	. .	. .	. .	. .
A. E. v. Siebold	238	188	. .	. .	. .	. .
Drs. Johnston and Sinclair	13,748	57	21	9	27	4

From this it appears, that in 343,670 cases, it occurred 881 times, or about 1 in 390. In 243 cases, when the result to the mother is given, 40 died, or about 1 in 6; but much allowance must be made for this excessive mortality, owing to mismanagement on the part of midwives before an accoucheur is called in. The immediate cause of death is generally hemorrhage.

658. Causes and Treatment. — The principal causes of retention of the placenta are: 1. Inertia of the uterus; 2. Irregular contraction of the uterus; and 3. Morbid adhesion between the uterus and placenta. These we shall consider separately, with their treatment.

1. *Inertia of the uterus.* — I have already stated that the contractions which expel the child generally detach the placenta, and often partially expel it, but it may be unaffected by them; in this state it will, of course, remain until the occurrence of uterine action. But cases not unfrequently occur in

which the uterus remains quiescent after expelling the child, owing sometimes to the length and severity of the labor, and sometimes, apparently, to a peculiarity of uterine constitution; in other words, to a cause unknown. Now, if in such cases the placenta be entirely adherent, no evil consequences will result for some time; there is, of course, the risk of a partial separation occurring, and a secondary risk from decomposition if it remain long enough: but there is no immediate danger. On the other hand, if it be partially or wholly detached, and lying in the uterus, the separation will have exposed many large vessels, and the absence of uterine contraction permits the uncontrolled escape of blood, so that, in these cases, there is generally more or less flooding — it may be, even to a fatal extent: therefore, in addition to the more distant danger, which these cases share in common with the former, there is immediate danger from hemorrhage, of the most urgent kind. If the hand be placed upon the abdomen, the uterus is felt large and flabby, without any of the firmness which is its characteristic in a state of active contraction.

659. **Treatment.** — The promptitude of our interference depends entirely upon the presence or absence of flooding. If there be great hemorrhage, the placenta must be instantly removed, either by traction by the cord, or by the introduction of the hand. There is one exception to this rule, however, and that is when hemorrhage has occurred to such an extent that the patient has fainted, and is almost moribund: in this case a very little additional loss may be fatal, even so little as may occur on removing the placenta; but as for the present it is arrested by the syncope, we may postpone the operation until the patient rallies a little, taking care not to wait until the hemorrhage return. "If there have already been hemorrhage so profuse as to occasion danger," says Denman, "and the common consequences of loss of blood, as fainting and the like, have already followed, the placenta ought not then to be extracted, nor the patient disturbed, nor any change made, till she is somewhat recovered from her extreme debility; as the danger would be thereby increased, and the patient die, during, or immediately after the operation, as I have seen and known in several instances."

There may, however, be no flooding: and in some cases it might be possible to remove the placenta by a steady pull at the cord, but to say nothing of the risk of breaking it, we should be only exposing the patient to a risk of hemorrhage by withdrawing the placenta whilst the uterus was relaxed. The best plan is first to try and excite the uterus to contract by friction and pressure upon the abdomen, and then to draw by the cord steadily and firmly. If the uterus still remain inert, we are recommended by M. Mojon, and some continental practitioners, to inject the umbilical vein with cold water, so as to stimulate the uterus by the impression of cold. I have mentioned this, but I should fear that there would be risk of exciting inflammation by it. I have, however, repeatedly given the ergot of rye in such cases, and with the best effects; when successful, it brings on uterine contractions, and causes the spontaneous expulsion of the after-birth, at the same time that it effectually guards against hemorrhage. If it fail, we have no resource but to extract the placenta by the hand, an operation *never to be lightly undertaken*, as it is one of the most dangerous, in consequence of the frequency with which it is followed by inflammation. It should be performed very gently and deliberately. The fingers, formed into a cone, are to be introduced into the vagina and os uteri, in the axis of the outlet and brim, guided by the funis, and so gradually up to the placenta, which may be grasped by its inner surface, as Hamilton and Burns recommend, or the finger may be gently insinuated between it and the uterus, so as to peel it off very carefully and gently. Great care must be taken, on the one hand, not to injure the surface of the uterus, and, on the other, to remove the whole of the placenta; and having done this, the detached mass should be grasped, and the uterus, which by the operation will be excited to action, allowed to expel both it and the hand. By so doing, we shall secure its contraction, and guard against hemorrhage, and meanwhile external pressure should be exerted by the other hand, and maintained by compresses and the binder. This operation should never be performed without clear conviction of its necessity. I perfectly agree with Dr. Denman, who observes, that although "it is often mentioned as a slight thing, yet I am persuaded that every person who attends to the consequences of the practice will think it of importance, and that, if possible, it always ought to be avoided.

After the operation, we must remain some time with the patient, to be sure that the uterus does not again relax, and hemorrhage ensue, giving ergot of rye if there be the least threatening, and for some time watch carefully lest inflammation should set in.

660. 2. *Irregular contraction.*—After the delivery of the child in ordinary cases, the uterus closes equably over the after-birth, pressing it on all sides and forming a globular tumor in the abdomen. There are occasional, though rare exceptions, however, to this equal contraction, in which the uterus contracts unequally, and yet forcibly, and so far from effecting the expulsion of the placenta, which is the principal object of its contraction, it is thereby effectually retained. This irregular contraction sometimes follows natural labor, but more frequently labor with mal-presentation or instrumental delivery, and it is attributed (not without justice, I think, in some cases) to the action of the ergot of rye.[1]

There are three kinds of irregular contraction which may be briefly noticed: 1. The first is seldom noticed in books, and yet it is of frequent occurrence. It appears to consist in a contraction of the fibres of the cervix uteri to a greater degree than of those of the body and fundus. If the hand be placed upon the abdomen, the uterus is to a certain degree, but not firmly, contracted, whilst, if the finger be passed into the os uteri, the cervix is found to be hard and contracted, and the cord when pulled does not *give*. The placenta is sometimes adherent, but more frequently partially or wholly detached, and a portion of it may often be felt in the os uteri. In common with the other varieties of irregular contraction there is sometimes hemorrhage, but frequently none at all, and the necessity for interference chiefly arises from the indisposition of the uterus to rectify the irregularity and expel the after-birth. The globular tumor, moderately contracted, the narrowed os uteri, and the firm retention of the placenta, even when partially or wholly detached, will distinguish these cases from all others.

2. The second irregular contraction is that which has received the name of "*hour-glass contraction.*" The fibres around the body of the uterus are thrown into a state of permanent contraction, the remaining portion being only in a state of moderate action, giving to the uterus something of the figure of an hour-glass, and dividing its cavity into two unequal chambers, an upper and a lower, in the former of which the placenta is mainly or entirely contained. It may be entirely adherent, or partially or wholly detached, though seldom the latter. Occasionally there is hemorrhage. This variety of irregular contraction has been attributed to the too rapid passage or extraction of the child; to a lingering labor with women of an irritable constitution, and to the partial action of ergot. Dr. Douglas

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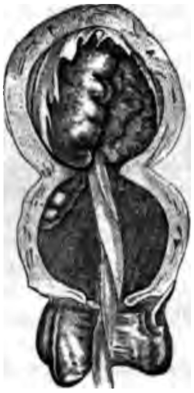
[1] Hasbrouck, New York Journal of Med., Nov. 1858, p. 334.

thinks that hour-glass contraction rarely or never occurs without morbid adhesion of the placenta. Drs. Campbell and F. Ramsbotham deem it a very rare occurrence. It is very seldom that we can discover any irregularity of form in the uterus by placing the hand on the abdomen, and, in consequence, the diagnosis is very obscure, until the hand be introduced for the purpose of extraction.

3. The third irregularity is a preponderating contraction of the circular fibres of the uterus, throwing the organ into the shape of a long cylinder, so that it feels narrower than usual; and instead of a globular tumor just above the pubis, it is often felt reaching up above the umbilicus, and internally it may be difficult to reach to the fundus. As in hour-glass contraction, there is not always flooding, and the causes are probably the same. The diagnosis is aided, however, by the shape of the uterus, although it is often sufficiently obscure.

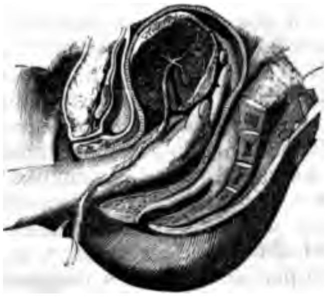
661. TREATMENT.—The first variety of irregular contraction can generally be remedied without the introduction of the hand. Steady and firm traction should be made by the cord in the axis of the brim, and maintained for some time without relaxation, at the same time that very firm pressure is made over the uterus, and towards the pelvic cavity; this in many cases overcomes the spasmodic action, and the placenta is rather suddenly released. If it fail, one or two fingers introduced within the os uteri may be sufficient, as they may be able to seize a portion of the after-birth, and so aid in the traction. I have seldom found it necessary to do more than this; but of course if it do not succeed, the placenta must be extracted by introducing the hand carefully and gently, as before described.

[Fig. 175]



Hour-glass Contraction of the Womb.

[Fig. 176.]



Removal of adherent Placenta.

In the second and third form of irregular contraction, traction by the cord is quite ineffectual, so firmly is the placenta grasped. We can only wait, therefore, until we are satisfied that it will not be separated and expelled naturally, and cannot be withdrawn by the cord, and then at once proceed to extract it. The introduction of the hand is to be effected in the way already described, until we arrive at the contraction, which is to be overcome by gentle but steady pressure of the points of the fingers gathered into a cone; and when we reach the placenta, we must remember to detach the whole, and to allow the hand to be expelled by the uterus. In the hour-glass contraction,

traction so close, that persons
the cord was traced was, in
erseverance, however, will show
though the child often escapes
is very rare for the placenta to

to be present, no reasonable
ulsion of the placenta ; to wait,
of time. The proper course
vercome the contraction of the
anual interference.]
commended for the relief of ir-
Dr. Ramsbotham that both are

the necessity of great care to se-
traction of the uterus afterwards.
to the uterus.— Many of the
eretofore referred, may occasion
nner surface of the uterus. Thus
ph connecting the two, or in in-
ently been affected by calcareous
pied by the adhesion is generally

of disease during pregnancy, and
It is much more dangerous than
action generally detaches more or
ing the mass in the uterus, prevents
ding orifices of the uterine vessels.
sometimes to an enormous extent.
cases where the adhesion is very

impossible, until the extraction is
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the after-birth. The previous his-
onfirm these suspicions ; if she have
of the uterus during pregnancy, it
tion. Whenever we see a patient
in by the stethoscope whether it is
that we may be prepared for the con-

e sure that the retention arises from
to the usual preliminary means, and,
The hand is to be introduced in the
the placenta, we shall discover that
it were amalgamated with the uterus.
violence in endeavoring to detach it ;
it is better to peel off the placenta
to separate the loose part from the
adhesion, leaving the latter in the uterus
chia. In a case of Dr. Smellie's, in
adherent portion, the patient died of
cases are on record.
arise from the decomposition of what
avoiding it, except by care afterwards.
al injections of tepid milk and water

should be used twice a-day, and any symptoms of inflammation *promptly treated.*

664. The extraction of the placenta may be rendered necessary by the rupture of the cord, inasmuch as we can afford no assistance; but it is by no means so easy, as we lose the guide it affords us into the os uteri and to the situation of the placenta. In such a case, of course, we must first try fairly what the natural powers, stimulated by friction and ergot, will effect, and if they fail, the hand must be introduced with greater caution, and the placenta very gently sought for, and detached in the usual manner. Once more let me repeat the necessity of removing all the placenta, for a small portion left behind may render all our exertions fruitless as to the result.

I have deferred the consideration of the treatment of the hemorrhage until the next chapter, as I preferred limiting this chapter strictly to the management of retained placenta; the two chapters should, therefore, be taken together.

CHAPTER XX.

PARTURITION.—CLASS III. COMPLEX LABOR.

ORDER 3. FLOODING.

665. THERE is no deviation from the ordinary course of labor so trying to the medical attendant as flooding; not only on account of the imminent danger; but from the sudden and rapid progress of the attack, and the impossibility of waiting for assistance. Nothing can preserve our calmness and presence of mind under such circumstances, but understanding the subject clearly beforehand, and being perfectly prepared for meeting each variety of the accident with its appropriate treatment.

I have already spoken of the hemorrhage accompanying abortion, and it remains now for us to consider those forms of flooding which occur just previous to or during labor and afterwards. During the last month of gestation and at the commencement of labor, patients are exposed to two forms of hemorrhage, differing in their causes, but depending upon the situation of the placenta. The first has been called "*accidental hemorrhage,*" because it arises from a partial and accidental separation of the placenta, which occupies its usual situation; and the second is justly termed "*unavoidable hemorrhage,*" because the placenta, being placed partially or wholly over the os uteri, the dilatation of this will unavoidably separate the after-birth, and give rise to hemorrhage: as Naegelè has observed, "the very action which nature uses to bring the child into the world is that by which she destroys both it and its mother." After delivery, flooding may occur to any extent, and from various causes.

Each of the varieties of hemorrhage will require a separate and careful consideration. But first let us ascertain their frequency and mortality, as far as possible.

666. **Statistics**:—

Authors.	Total No. of Cases.	Flooding Cases.	Mothers lost.	Children lost.	Accidental hemorrhage.	Mothers lost.	Unavoidable hemorrhage.	Mothers lost.	Hemorrhage after Labor.	Mothers lost.
Mr. Giffard	. .	35	6	14	1	. .	19	5	5	1
Dr. Smellie	. .	34	13	16	6	3	24	8	3	2
Mr. Perfect	. .	18	6	7	8	2	6	3	2	1
Dr. Bland	1,897	9	3	8	. .	. .	. .	.	.	.
Dr. Jos. Clarke	10,387	24	5	10	10	4	4	1	10	.
Dr. Merriman	2,947	32	1	14	21	. .	4	1	5	.
Dr. Granville	640	2	. .	. .	1	. .	2	.	.	.
Dr. F. Ramsbotham	49,996	350	. .	135	159	. .	83	.	108	.
Edinburgh Hospital	2,452	31	3	. .	1	1	2	1	28	1
Dr. Collins	16,414	131	12	17	13	2	11	2	107	8
Dr. Cusack	701	15	. .	. .	6	. .	. .	.	5	.
Dr. Maunsell	839	110	1	. .	. .	. .	5	1	6	1
Dr. Beatty	1,182	6	1	. .	. .	. .	4	0	2	1
Dr. Lever	4,666	51	4	7	16	. .	13	2	35	2
Mr. French	89	5	. .	. .	. .	. .	1	.	.	.
Dr. R. Lee	. .	47	10	. .	24	4	23	6	.	.
Dr. Reid	3,250	52	. .	. .	22	. .	3	.	27	.
Mr. Warrington	110	4	. .	1	. .	. .	2	.	2	.
Dr. Churchill	1,640	25	0	0	3	0	1	0	21	.
Drs. M'Clintock and Hardy	6,634	93	. .	. .	29	4	8	3	56	7
Birmingham Hospital	650	. .	. .	. .	. .	. .	4	1	.	.
Mr. Earle	4,320	. .	. .	. .	. .	. .	22	.	.	.
Mr. Rose	600	20	. .	. .	18	. .	2	.	.	.
Mr. Bailey	2,819	61	. .	. .	56	. .	5	.	.	.
Dr. Toogood	1,135	21	. .	. .	. .	. .	1	.	.	.
Dr. J. Lee	850	11	. .	. .	. .	. .	4	.	7	.
Mr. Watson	800	27	. .	. .	. .	. .	. .	2	.	.
Dr. Copeland	1,290	. .	. .	.	5	. .	2	.	.	.
Mr. J. Thompson	3,300	13	3	5	. .	. .	5	2	.	.
Drs. Johnston and Sinclair	13,740	105	10	43	81	4	24	6	33	2
Dr. Hall Davis	7,300	284	2	16	23	0	11	2	39	1
Dr. Richter	624	5	. .	. .	. .	. .	5	.	.	.
A. E. v. Siebold	730	9	2	1	. .	. .	3	2	6	0
Dr. Voigtel	29	1	0	1	. .	. .	1	0	.	.
Dr. Jansen	13,365	11	. .	. .	4	. .	7	.	.	.
Dr. Bartsch	4,383	. .	. .	. .	. .	. .	11	6	.	.
Dr. Klein	11,410	. .	. .	. .	. .	. .	15	2	.	.
Dr. Arneth	6,527	. .	. .	. .	. .	. .	9	1	.	.

From this table we find that in 163,738 cases, hemorrhage occurred 1338 times, or about 1 in 122; out of 782 cases of hemorrhage, 126 mothers were lost, or about 1 in 6; out of 944 cases, 288 children were lost, or about 1 in 3.

Further, out of 218 cases of accidental hemorrhage, 32 proved fatal, or 1 in 6; out of 261 cases of unavoidable hemorrhage, 71 proved fatal, or nearly 1 in 3½; and out of 365 cases of flooding after delivery, 25 proved fatal, or about 1 in 14.

667. 1. **Accidental Hemorrhage.**—In these cases, as I have said, the placenta is in its ordinary situation; it may be at any part of the uterine parietes except the cervix, as then the case would come under the class of unavoidable hemorrhage. The immediate cause of the flooding is the separation of some portion of the placenta from the womb and the laceration of its vessels; as these cannot be closed by the uterine contraction,

because the uterus is full, of course the blood is poured out freely. The amount of the loss is said to be in proportion to the extent of the surface exposed, and, perhaps, in many cases this may be true, but there are striking exceptions: fatal hemorrhage may take place from a space not more than an inch square. In some rare cases, a portion of the centre of the placenta is detached, and a cavity formed which is filled with blood, but as it is surrounded with adherent after-birth, of course none escapes externally. Or it may extend beyond the placenta, and be retained by the adhesion of the membranes or other causes. "In such cases," Dr. Burns remarks, "the effusion is accompanied with dull internal pain at the spot where it takes place. This pain is something like colic, or like the pain attending the approach of the menses. The part of the womb where the extravasation takes place, swells gradually, and in a short time the uterus feels larger. If the quantity be considerable, the size increases, the uterus is felt to be firmer and tenser, as well as larger, the strength diminishes, and some faintings may come on. In course of time, weak, slow pains are felt; but if the injury be great, these decline as the weakness increases. They may or may not be attended with the discharge of coagula from the os uteri." The hemorrhage, in fact, is at first internal, and generally, though not always, becomes external. Dr. Burns suggests that in some cases the bleeding may be the result of the separation of the decidua, and a laceration of the vessels running to that membrane from the inner coat of the uterus, and not from a separation of the placenta.

668. CAUSES.—Violent shocks, such as blows, falls, etc., may have the effect of detaching a portion of the placenta, and in some cases, a very slight shock will be sufficient; I was called to a case in which it was effected by a hearty fit of laughter. Besides these causes, fatigue, over-exertion, violent straining at stool, lifting heavy weights, excessive action of the utero-placental vessels, disease of the placenta, general plethora, spasmodic action of that portion of the womb to which the placenta is attached, may be equally effective. Dr. Burns observes, "we sometimes find that extravasation is produced by an increased action of the uterine vessels themselves, existing as a local disease. In this case, the patient for some time before the attack feels a weight and uneasy sensation about the hypogastric region, with slight darting pains about the belly or back." It may also occur in the course of labor, the placenta being partially detached by the uterine action, and may even prove fatal.

669. SYMPTOMS.—The exciting cause may be instantly followed by the discharge, or preceded by general and local uneasiness, dull pain and aching in the belly and back: and if the hemorrhage be retained, by rigors, tension, and weight in the abdomen, and by faintness. When the flooding is internal during labor, none may escape until after the expulsion of the child or placenta, as occurred with a patient of mine; and the characteristic symptoms are gradual diminution or cessation of the pains, with fainting, which may possibly be mistaken for symptoms of laceration, but differing from this latter accident in the *gradual* cessation of the pains, and the absence of recession of the head. At length, with or without a pain, the dischage commences, varying in amount from a few ounces to a quantity sufficient to compromise the patient's safety.

If it be profuse, the patient faints, of course, and for a time the discharge is arrested; but after she has rallied, it again recurs, and the syncope is repeated. The surface is blanched and covered with cold sweat, the countenance sunk, with dark circles around the eyes, the pulse becomes weak, quick, and fluttering. If the flooding be not arrested, all these symptoms increase; the sight becomes dim, there is a ringing in the ears, frequent sighings, intolerable restlessness, uneasiness, jactitation, and death; preceded by fainting or convulsions. The fatal result is not always in proportion to the amount of hemorrhage; in certain constitutions or in certain conditions, a comparatively small loss will end fatally, whereas in others a much larger loss will be borne with impunity.

Labor pains may come on at some period of the discharge, or they may be entirely absent; a good deal will depend on the period of pregnancy at which the complication occurs. If they do, it will be observed that during a pain the hemorrhage is arrested, but that it returns on the cessation of the pain.

If an internal examination be made, the os uteri will seldom be found dilated, unless there have been pains for some time, but the cervix is generally softened and relaxed by the hemorrhage; and what is of great importance, in most cases we can pass the finger within the os uteri sufficiently to ascertain the presence of the membranes, and that no part of the placenta is within reach.

As regards the child, this complication is most dangerous; if the hemorrhage be excessive it is almost always still-born.

670. Diagnosis.—The diagnosis of accidental from unavoidable hemorrhage is of extreme importance, inasmuch as the treatment of the two is essentially different. There are four points in which the two varieties differ remarkably, and which will enable us to distinguish them. In the first place, we can generally make out some definite external cause for accidental hemorrhage, and its occurrence is accidental and irregular, whereas in unavoidable hemorrhage the only exciting cause is the expansion of the cervix, and the time of its first occurrence has a certain degree of regularity. Secondly, in accidental hemorrhage the discharge takes place freely, during an interval, but is at once arrested by a pain during its continuance; but in unavoidable hemorrhage the discharge which continues also during the intervals, is greatly increased during the pains. Thirdly, in cases of accidental hemorrhage, the os uteri is free, closed by membranes only, and the cervix is of equal thickness all round; whereas in placenta prævia the os uteri is more or less covered by the after-birth, or if it only reach to the edge of the cervix, the latter is felt to be considerably thickened at that part. Lastly, in many cases we may ascertain the situation of the placenta by the stethoscope, and its presence in the body or fundus of the uterus will decide the case to be one of accidental hemorrhage.

I have already stated that weakening or cessation of pains, fainting, sense of distension, are the characters of internal hemorrhage, with the absence of any other cause calculated to produce these symptoms.

671. Treatment.—The indications of management must be drawn from the period of pregnancy, the state of the os uteri, and amount of discharge.

Let us suppose that the patient has not arrived at her full time, that she has no pains, that the os uteri has not begun to dilate, and that the discharge is not profuse. In such a case the patient is not in immediate danger; and as prompt delivery would be difficult, it may be well to temporize, and see how far we can arrest the discharge. For which purpose the patient should be placed in bed on a hard mattress, and very lightly covered with bed-clothes; the temperature of the room should be reduced very low, and nothing but cold drinks allowed. Enemata of cold water exert a very powerful control in such cases. The plug may be used (according to the restrictions formerly laid down), inasmuch as the uterus being full, there is little danger of internal hemorrhage to any extent. The best plug is cotton wool, which may be most easily introduced through a cylindrical speculum; but we may use common tow, or one or two silk handkerchiefs; and the object will not be attained unless the vagina be quite filled.

Internally we may give the acid mixture, with a large proportion of acid;

for instance, half an ounce of dilute sulphuric acid to six ounces of infusion of roses, an ounce to be taken every hour. To tell the truth, I think it is more highly estimated than it deserves. Lead, in large doses (gr. x. Acet. Plumb. 2dis horis), has been recommended: Dr. Conquest speaks favorably of it. It may be combined with opium, or either may be given separately. I have no doubt of the beneficial effects of opium, either in large doses (gr. ij.) or (gtt. lx. Træ. Opii), or repeated small ones. I have also seen the Tinct. Cannabis Indicæ exert very beneficial influence.

Large drinks of cold water alone, or with the addition of the nitrate of potash, seem beneficial. Of course the patient cannot be allowed to sit up, or to leave her bed, and it is an advantage to free the bowels by enemata of cold water, as involving less effort in the evacuation.

672. There are many cases in which, under this treatment, the discharge is diminished, and the patient carried to her full time in safety; but in others it will fail, either on account of the increase of the discharge or because the pains of labor are brought on. In these cases, as well as in those where the amount of discharge is great from the beginning, another line of treatment is practised which would be very doubtful in the former case. I have said that the discharge is observed to cease during a pain, and the reason is simple. During a pain, the placenta is pressed by the contents of the uterus on the one hand, and against the bleeding vessels on the other, and by its pressure as a tourniquet, the flow of blood is arrested. An observation of this fact led to the inference, that if the liquor amnii were evacuated, the pains would be quickened, the pressure increased and rendered more permanent, besides that the labor would be sooner terminated. As Dr. F. Ramsbotham has remarked, "the vessels of the uterus are diminished in size by the contractions of the uterine parietes: the open orifices are in a degree plugged by the parietes being brought into closer and stronger contact with that portion of the placental mass disunited from the uterine surface; and the pains are usually increased in frequency and power by the augmented stimulus impressed upon the os uteri." Moreover, in cases of large flooding, we need not anticipate the usual delay in the dilatation of the os uteri; for, as I have mentioned, the hemorrhage softens the cervix uteri, and prepares it to yield easily to the pressure of the head. In these cases, therefore, when the flooding is profuse, and the danger imminent, the membranes should be ruptured by the finger or a female catheter. Soon afterwards, we find the pains increase, the flooding diminish, and the labor advance.

For the clear understanding of the principles of this practice, and the cases to which it is suited, we are mainly indebted to the late Dr. Rigby of Norwich, who published his valuable essay on Uterine Hemorrhage in 1775, although the plan was first recommended by Julian Clement and Puzos. That it is very successful we have the testimony of many authors, as Denman, Baudelocque, Merriman, Ramsbotham, Blundell, etc. Dr. Rigby succeeded by it in 64 cases, without having occasion to turn the child. Dr. Merriman in 30 cases. Dr. F. Ramsbotham in 23 out of 25 cases.

Some writers, as Hamilton, Burns, Stewart, etc., have opposed the evacuation of the liquor amnii on the following grounds: 1, that by it gestation is suspended: 2, that it is not certain to bring on labor in time to avoid danger: and, 3, that it may not arrest the hemorrhage, and if not, we must turn and deliver under more disadvantageous circumstances. The first objection is true, but of no value, unless the others be true also; for if the operation succeed, and save the woman's life, which is in danger, the shortening of gestation is of no consequence. The second objection, though contrary to the general opinion, is better founded; for although, where there are pretty good pains, they increase after rupture of the membranes, especially if ergot be given, yet if there be little or no uterine effect before the membranes are ruptured, pains may not come on and the hemorrhage may prove fatal. I saw one example of this, and on post-mortem examination, the head of the child was found filling the brim, and the uterus filled with blood. The third objection I think hardly holds good, if the pains have been good before rupturing the membranes; for most likely the pains will increase; and if not, there will be but little more difficulty in turning.

673. I should say, then, that if there be decided pains and dilatation, or good pressure upon the os uteri, that we may safely give an ample dose of ergot, and before the loss has been excessive, rupture the membranes for the purpose at once of arresting the hemorrhage and hastening the labor. But if there be no uterine effort, or very slight pains, it would be dangerous practice to rupture the membranes. If you remember that the uterus is so filled that external hemorrhage cannot take place to a very great extent, you will see that by plugging the vagina thoroughly, all external hemorrhage can be stopped. If so, is it not better to do that, and gain time until an effort be made to excite uterine action? Besides, we often find that when we succeed in thus arresting the hemorrhage for a time, on the removal of the plug (which ought to be done every day) it does not return. After filling the vagina thoroughly, therefore, I would advise that half-a-drachm of powdered ergot should be given every three or four hours for a time, until uterine action is fully excited, and then, if the hemorrhage return, we shall be justified in rupturing the membranes. If this fail, or in place of it, we ought to try the effect of galvanism, by which Dr. Radford succeeded in cases in which there was no uterine action and a rigid and undilated os uteri. Drs. Hæniger and Jacoby, Mr. Cleveland, Mr. Dorrington,[1] Mr. Wilson,[2] and Mr. Clarke,[3] have also found a favorable result from its employment. If this fail, or be counter-indicated, then we must adopt the plan recommended (without any definite notion of the nature of the case) by Ambrose Paré, Guillemeau, etc. etc, viz., introduce the hand and bring down the feet, thus terminating the labor. The operation will be facilitated by the relaxation produced by flooding, and though more dangerous for the child, if the mother's safety demand it, must be done.

The child may be premature, however, the os uteri not sufficiently dilated, or there may be other reasons why this operation is objectionable, although immediate delivery is called for; and in such cases, as the os uteri is generally soft and dilatable to a certain extent, and the child dead, I have found it the best plan to perforate the head and extract with the crotchet. The operation is not difficult, nor is there any risk, if the operator be careful to protect the point of the perforator, and afterwards to extract slowly, cautiously, and at intervals.

In the case of internal hemorrhage occurring during the progress of the labor, the treatment will depend upon the stage of the labor, and the amount lost, judging by its effects. If the patient be in danger of sinking, and the os uteri dilatable, but the head within the uterus, there can be no doubt that we must deliver by turning; but if the loss be moderate, we may perhaps afford to wait until the head descends into the cavity of the pelvis; and in all cases where it is within reach of the forceps, they ought to be used for immediate delivery, if the case be mechanically suitable. But little hesitation need be felt on account of the child in deciding upon the mode of delivery, as it is lost in almost every case of excessive hemorrhage.

674. By a judicious application of the suggestions I have made, we shall be able to temporize beneficially in cases where no pains exist, or perhaps to carry on the patient to her full time; or if there be pains, or we succeed

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[1] Prov. Med and Surg. Journal, March 11th, 1846, p. 105.

[2] Ibid. April 29th, 1846.

[3] Dublin Hosp. Gazette, March 1st, 1848.

in exciting them, then, by one or other of these methods, we may almost always succeed in terminating the labor without incurring an additional loss of blood, and if that have not been excessive previously, the mother may be saved. As we have seen, nearly one in three are lost. There is danger to the child in proportion to the hemorrhage, and additional danger if we are obliged to turn.

There are cases, however, to which we are called after alarming flooding has continued for some time, and although we succeed in delivering the woman, she may die afterwards from loss of blood. In such extreme cases, and such only, transfusion, as recommended by Dr. Blundell, seems to be the only resource. It has succeeded in fourteen cases on record; but it has also failed many times. It is performed by means of a syringe and tube; a small tube is inserted into the median or other vein of the woman's arm, and blood from a healthy person is taken up by the syringe, previously warmed, and after expelling all the air from the instrument, its pipe is passed into the small tube, and the blood very slowly forced in. If the lips or eyelids of the patient quiver, or the respiration become more difficult, we must stop, or death may result. If her countenance and pulse improve, we may continue. In this manner blood to the amount of sixteen or eighteen ounces may be gradually injected, if necessary; although a much less quantity may save the patient. Great care must be taken that the instrument be clean, and of a proper temperature, and that the blood be healthy and fluid.

Two additional successful cases have been recently published by Mr. Wheatcroft.[1]

675. In all these cases, a liberal but judicious allowance of stimulants is necessary; but in regulating the amount, we must not forget that the subsequent reaction will be somewhat in proportion.

As to the placenta, it is very often expelled immediately after the child, and if it be not, it will be much better to extract it, and secure a firm contraction of the uterus, than to allow the hemorrhage to continue.

After the delivery is completed, the stimulants must be continued, if necessary, or chicken broth may be substituted for them. Notwithstanding the danger of suspending uterine action, I have seen so much benefit from small doses of laudanum combined with ammonia, that I have no hesitation in recommending its exhibition.

The utmost watchfulness will be needed to suppress any return of the hemorrhage, and to enable us to guard against any subsequent attack; for it should always be borne in mind that hemorrhage is by no means a guarantee against inflammation afterwards.

676. 2. UNAVOIDABLE HEMORRHAGE. *Placenta prœvia, placental presentation*, etc.—In this variety, the flooding is the necessary consequence of the dilatation of the os uteri, by which the connection between the placenta and the uterus is separated, and the more the labor advances, until the head passes through the os uteri, the greater the disruption, and the more excessive the hemorrhage. From this very circumstance it follows that the danger is much greater than in the former cases, and also that what in them was the natural mode of relief, is here an aggravation of the evil, and cannot be employed as a remedy.

In these cases the placenta may be situated partially or entirely over the os uteri (fig. 177), or it may come down only to the edge of the cervix uteri; and there is some difference in the management accordingly.

That the placenta was occasionally found at the os uteri was known as early as the time of Guillemeau, Mauriceau, Deventer, Pugh, etc., but they believed that it had originally been situated differently, but had been detached and fallen down. Paul Portal first spoke of it as adhering to this part, in consequence of which he was obliged to deliver by art. Giffard,

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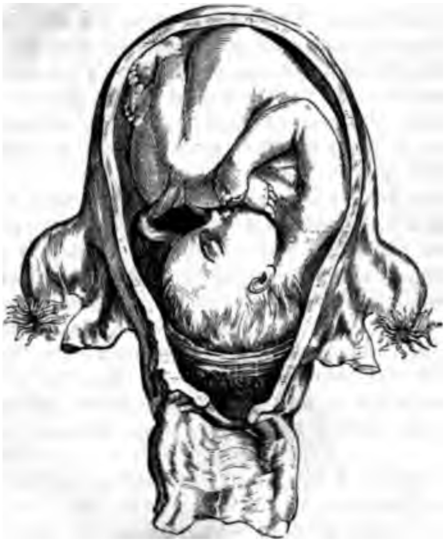
[1] British Medical Journal, April 10, 1858, p. 290.

Fig. 177.



Placenta Prævia.

Levret, Rœderer, and Smellie were also cognizant of this fact, and they seem to have been aware of the mode in which the hemorrhage was produced, and of its inevitable occurrence. But it is undoubtedly to Dr. Rigby, of Norwich, that the profession is indebted for the full and clear elucidation of the subject. Time, which is the great test of merit, has only confirmed the truth of his observations, and illustrated the value of his essay.

677. The cause of the hemorrhage is evidently the separation of the placenta from the cervix uteri, and the exposure of the mouths of the torn vessels; and this separation is effected and increased by the uterine contractions dilating the os uteri.

Dr. Simpson considers that the source of the hemorrhage is, mainly at least, from the placenta, and that it is venous in character; in this I cannot agree with him. I am sure I have as frequently, at least, noticed the blood to be arterial as venous, and this observation has been recently confirmed by Dr. Mackenzie, of London, whose experiments appear to me to prove satisfactorily that, though some blood may escape from the separated portion of the placenta, by far the principal portion is from the uterine vessel.[1] Dr. Barnes also considers the uterus to be the source of the blood.

678. SYMPTOMS.—The first discharge is usually about three weeks before labor commences, coincident with the commencement of the process of dilatation already noticed. The amount of the discharge varies, but in general it is not excessive in the first instance, nor is it accompanied with pain. After its cessation, the patient rallies; but in a week or two it returns, perhaps in greater quantity, and again ceases, thus continuing (if not interfered with, or if premature labor do not come on) until the full term.

[1] Association Journal, Dec. 23d, 1853, p. 1127.

With the first sensible contraction of the uterus, the flooding comes on more profusely, and is observed to increase during each pain. Thus it would go on until death supervened before delivery in most cases, if no assistance were afforded. I say in most instances, because there are some cases on record in which the placenta was forced through the os uteri before or along with the child, decidedly the happiest natural termination. The first case on record, I believe, is that by F. Lossius, in his Observ. Medicinal., 1672, p. 380, obs. 24, in the following words: "tandem secundiam ante partum excluserat, non tantum fœtu sed et matre salvâ." I am indebted to my friend, Dr. Aquilla Smith, for this early example. Besides this, Smellie and Lee have recorded three; Ramsbotham five; Hamilton two; F. Ramsbotham two; Baudelocque, Perfect, Chapman, Merriman, Barlow, Collins, and Maunsell, one; etc., etc.

Thus far the symptoms are alike (supposing the head to present), whether the placenta be situated entirely or partially over the os uteri or only down to its margin; but the difference is detected on making an internal examination. In the former case, the os uteri is felt to be closed by a thick, soft, spongy mass, firmer than a clot, and not breaking down under the finger, through which the presentation cannot be felt; in the second, this spongy mass stretches over a portion only of the os uteri; its edge can be distinctly felt, and also the membranes covering the remaining portion of the os uteri, through which we may be able to detect the presentation; whilst in the third case the os uteri is closed by the membranes only; but some portion of the cervix is found to be much thickened, whilst the rest is of the usual thickness; in the latter case, after delivery, the perforation in the membranes is found close to the os uteri.

I should mention that in some cases where the placenta covers the os at the beginning, it is found to extend only partially over the orifice when dilated.

If the feet present, with only a partial implantation of the placenta, or with it coming to the margin of the os uteri only, they may pass through the os uteri; and although the detachment of the placenta will increase with the dilatation, yet the flooding will be arrested by the pressure of the body of the child upon the placenta. This may be considered as the most favorable presentation in "placenta prævia," because it saves the introduction of the hand to turn the child.

The effects of the hemorrhage upon the mother, are precisely as before described, but produced more rapidly, and more speedily fatal.

679. Diagnosis.—The sudden and apparently causeless occurrence of the first hemorrhage, the increased discharge during a pain, and the detection of the placenta, partially or wholly covering the os uteri, or descending to its margin, are the distinctive characteristics of placenta prævia; in accidental hemorrhage, as before observed, there is generally some assignable cause, the discharge is arrested during a pain, the os uteri is closed by the membranes, and the placental murmur can generally be heard away from the os uteri.

There may occasionally be some doubt as to whether the os uteri be closed by a clot or by the placenta; but the former is less firm, and is easily broken up by the finger, and we may often feel the adhesion of the placenta to the cervix within the os uteri.

680. Treatment.—If we are called on the occasion of the first or second hemorrhages, and find that the discharge has not been great, and that the term of pregnancy not being complete, the uterus is not in action, we may try palliative treatment, as previously recommended (§ 671), perfect quiet, rest on a hard bed, a cool room, and light clothing, with cold and acid drinks, enemata of cold water, small doses of opium, and the plug if neces-

sary. The bowels must be gently freed. It is hardly necessary to say that in no form of uterine hemorrhage is venesection admissible.

But the hemorrhage may be so profuse as to demand interference, or if not so at first, it will become so immediately on the commencement of labor; and, from the nature of the case, there is no hope of a natural termination, unless the pains be so violent as to force away the placenta before the child; and as we need not wait for it, nor for the occurrence of uterine action, the only question is whether the os uteri is in such a condition as to admit the passage of the hand without risk of laceration. If not, which will probably be the case if gestation be not completed, we must wait, and fortunately, in the plug well applied, we possess a means of control over the discharge, for in this variety there is absolutely no danger of internal hemorrhage. When we have thoroughly plugged the vagina, we may give any hemostatic remedies we please, and on removing the plug, we must ascertain whether the os uteri is more yielding, and either replace the plug, or turn, according as we find, just as was advised by M. Leroux, in 1776. Very often, as in a case I saw lately, the flooding does not return, and if the placenta only partially cover the os uteri, labor may come on and terminate naturally.

But if, on examination, we find the os soft, yielding, or dilated, there is no occasion to delay, and the best plan is to terminate the labor before the woman's constitution has suffered greater damage.

The hand is to be passed in the usual way into the vagina, in the axis of the lower outlet, and its direction immediately changed into that of the brim, which will bring the points of the fingers near to the os uteri, into which they are to be gently yet firmly insinuated, and then passed between the placenta and cervix, on that side on which we believe the placenta to be narrowest, until it arrive at the membranes, which must be pierced, and the feet found and brought down. Some writers, Smellie and Mohrenheim, for instance, have proposed to perforate the placenta, instead of passing the hand between it and the uterus; this is by no means easy, and appears to me extremely objectionable. When the body of the child is in the pelvis, it will act as a tourniquet, and the flooding will cease; nevertheless, it is well not to delay the delivery, as internal hemorrhage might occur. The mode of completing it I have already described: it is rarely that a child is saved.

In placental presentation, even more than in accidental hemorrhage, it is desirable to extract the placenta if it do not follow the child immediately, and the same care and watchfulness will be necessary to secure a good permanent contraction, and to guard against subsequent hemorrhage. Pressure above and over the uterus should be made with compresses and the binder, and if there be much draining, cold must be applied to the vulva, and ergot or cold enemata administered.

681. It is an advantage if the foot present, even when the placenta covers the os uteri, because the operation of turning is rendered easier; but when the os uteri is only partially covered, this is still greater, because by rupturing the membranes we facilitate the descent of the feet, and have only to seize them in the vagina and extract the child.

When the placenta reaches only to the margin of the os uteri, the case is truly one of unavoidable hemorrhage; but yet it admits of the same treatment as accidental hemorrhage, no matter what be the presentation, temporizing, if that be necessary, but if there be pains, after rupturing the membranes, the pressure of the head whilst dilating the os uteri will close the mouths of the bleeding vessels with the placenta, and so arrest the flooding until the child is expelled. This I have found by repeated experience, and therefore, when we are certain of the case, and pains are present, our duty is limited in the first instance to evacuating the liquor amnii; but if this fail, we must turn and deliver the child.

682. Such has been hitherto the mode of proceeding recommended by practitioners of the highest authority; it remained for my learned and ingenious friends, Dr. Radford and Prof. Simpson, to propose another, which at first sight is remarkable mainly for its boldness, but which Prof. Simpson has supported with his usual research, and which is at present the subject of controversy.

I have already stated (§ 678) that the placenta is sometimes expelled before the child, and that the mother is not always lost in these cases. Now, it appears that these instances are not so rare as was supposed. Dr. Simpson has collected 56 published cases, and he has been furnished with 74 unpublished ones (130 in all), in which the placenta was either expelled or extracted first, and he finds that in all, 10 women died, or about 1 in 13: and of 110 cases the infant was born dead in 73, or 69 per cent., and alive in 33, or 31 per cent., *i. e.*, nearly every third child was saved. In placenta prævia, under ordinary management, 1 in 3, or thereabouts, of the mothers are lost, and more than half of the children.

Taking this as the basis of his proposal, Dr. Simpson advises us in certain cases to substitute extraction of the placenta for turning the child. In justice to the Professor, it must be remembered that he does not intend that this plan should in every case supersede either the rupture of the membranes or turning the child.

Dr. Lee, of London, who has entered into controversy with Dr. Simpson, has objected to the proposed plan:—1. That the mortality, under the ordinary treatment, as stated by Dr. Simpson and me, is exaggerated; but he is far from having proved this. 2. That it was never practised by the older accoucheurs; but this would be equally an objection to any improvement. 3. That the child must inevitably be sacrificed; this would be a very serious objection, if the mortality among the children in the ordinary mode of treatment were small, but it is so great that it is an insufficient argument on which to reject the operation.

The probability of hemorrhage after the extraction of the placenta would most likely occur to any one as an objection; but Dr. Simpson states that "in 19 out of 20 cases in which it has happened, the attendant hemorrhage has either been at once arrested, or it has become so much diminished as not to be afterwards alarming." This Dr. Simpson attempts to explain by the supposition that the bleeding proceeds almost entirely from the placenta, and not from the uterus. But Dr. Lee contends, and I think correctly, that it escapes from the uterine sinuses laid bare by the detachment of the placenta. Dr. Ashwell advocates this view, and, with others of high authority, decidedly oppose Dr. Simpson's plan of extraction.

683. Let us next see in what cases it is proposed to have recourse to this novel operation, and then we shall be in a condition to investigate its merits better. Professor Simpson thus states the circumstances in which he would recommend it:—"When the hemorrhage is so great as to show the necessity of interference, and is not restrainable or restrained by milder measures (such as the evacuation of the liquor amnii), but at the same time turning or any other mode of immediate or forcible delivery of the child is especially hazardous or impracticable, in consequence of the undilated or undeveloped state of the os uteri, the contraction of the pelvic passages, etc. Or, again, the death, prematurity, or non-viability of the infant may not require us to adopt modes of delivery for its sake, that are accompanied (as turning is) with much peril to the mother, provided we have a simpler and safer means, such as the detachment of the placenta, for at once commanding and restraining the hemorrhage and guarding the life of the parent against the

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dangers of its continuance. Hence, as I have elsewhere stated, I believe that the suppression of the flooding, by the total detachment of the placenta, will be found the proper line of practice in severe cases of unavoidable hemorrhage, complicated with an os uteri so insufficiently dilated and undilatable as not to allow of version being performed with perfect safety to the mother;—therefore, in most primiparæ, in many cases in which placental presentations are (as very often happens) connected with premature labor and imperfect development of the cervix and os uteri; in labors supervening earlier than the seventh month; when the uterus is too contracted to allow of turning; when the pelvis or passages of the mother are organically contracted; when the child is dead; when it is premature and not viable, and where the mother is in such an extreme state of exhaustion as to be unable, without immediate peril of life, to be submitted to the shock and dangers of turning or forcible delivery of the infant. This enumeration is far from comprehending all the forms of placental presentations that are met with in practice; but it certainly includes a considerable proportion of the cases of this obstetric complication; and among them, all, or almost all, of the most dangerous and most difficult varieties of unavoidable hemorrhage. In adopting the practice, one error, which I would strongly protest against, has been committed in some instances. Besides completely detaching and withdrawing the placenta, the child has been subsequently extracted by direct operative interference. If the hemorrhage ceases, as it usually does, upon the placenta being completely separated, the expulsion of the child should be subsequently left to nature, unless it present preternaturally, or the labor afterwards show any kind of complication which of itself would require operative interference under any other circumstances. Both to detach a placenta and extract a child would be hazarding a double, instead of a single operation."

Dr. Radford states that the placenta ought never to be detached in such cases, unless, "1. The danger to the woman is so great from exhaustion as to render the ordinary plan of delivery, by turning the child, hazardous. 2. When there exists some obstacle to the extraction of the child, either from distortion in the bones of the pelvis, or tumors connected with it, or in its cavity, but connected with the soft parts. 3. When the child is dead." Subsequently, he protests against the operation until the cervix and os uteri will allow the introduction of the hand, as that "is the only instrument by which the placenta should be detached; indeed, I hesitate not to say, that it cannot be safely and effectually separated by any other means."

Dr. Edwards thus sums up the cases in which this practice seems admissible. 1. When the patient is of so weakly and delicate a constitution, that loss of blood to any great extent would be attended with present danger and subsequent injurious effects. 2. When the child is well ascertained to be dead. 3. In cases in which the powers of life have been excessively lowered by the hemorrhage, and the os uteri remains firm and unyielding. 4. In cases in which, although the os uteri is dilatable, the powers of life would be unequal to the shock of turning. 5. In primiparæ, when the soft parts are so contracted that they would be liable to be bruised or torn in turning. 6. In contracted pelvis.

684. We shall now examine in detail the practical value of this operation in the cases proposed, so far as our facts will permit, and assuming the correctness of Dr. Simpson's statistics. The rates of mortality, by the ordinary treatment, I believe to be about one in three of the mothers, and sixty-five per cent. of the children, according to a statement of Dr. Lee's, quoted by Dr. Simpson, *i. e.*, of course, taking large numbers. According to Dr. Simpson, when the placenta has been first expelled or detached, the mortality is one in fourteen of the mothers, and sixty-nine per cent. of the chil-

dren. So far there appears to be an important advantage gained by the new method, but it will be found, on further inquiry, that there are great difficulties, if not insurmountable objections to it.

1. There appears to me great practical difference between the placenta being expelled first, and extracted first, although Dr. Simpson makes none, but includes both equally in his statistical table. The former is the result of vigorous uterine action: the latter may or may not be accompanied by it; and I think there is much force in the doubt expressed by Dr. Barnes, as to whether the results would be as favorable in cases of detached as of expelled placenta. The 17 cases quoted from Dr. West by Dr. Simpson, are much too few for proof. Dr. Radford has given two tables, the first of 41 cases, and the second of 14 cases, in which the placenta was separated and detached by the hand, and of these 5 mothers were lost, or 1 in 11, and 7 children saved, or 1 in 8. Of 20 no information is given. We must remember that in the one case there is no irritation, no force applied to the cervix and os uteri, in the other there must be.

2. This distinction between detached and expelled placenta alters the ratio of mortality among the children fearfully. Dr. Simpson has recorded in his tables, but one case of the child being born alive, when the interval after the expulsion or extraction of the placenta was more than 10 minutes; and 16 of the 17 children, in the cases quoted from Dr. West were lost. If any attempt be made to save the child by artificial delivery, this will be to "incur the hazard of a double operation," and will defeat the object of Dr. Simpson's proposal.

3. In Dr. Simpson's first table, of 47 cases, with an interval after the expulsion or extraction of the placenta of from ten minutes to ten hours before the birth of the child, I find that delivery was completed by art in 18 cases, in 14 of them by turning. In the second table, of 21 cases, where the interval was less than ten minutes, in 7 cases by turning, and in one by evisceration. In the third table, of 27 cases, where the child came with the placenta, or followed immediately, there are 5 cases of turning, and 1 of extraction recorded. In the fourth table, of 27 cases, where the interval is unknown, delivery was effected by turning in 15 cases, by the forceps in 2, and by decapitation in one.

From this it appears that in a very large proportion of cases (46 cases in 119), artificial delivery was necessary, in many, no doubt, from mal-presentation; but still, in these cases, detachment of the placenta alone would have been useless, in many injurious; nor, if the operation were performed before the dilatation of the os uteri, could the mal-presentation have always been ascertained. Again, we find that delivery by art was more frequent, according as the interval after the separation of the placenta was prolonged, and I should suppose, although Dr. S. does not mention it in his tables, that the interval would be much greater in cases where the placenta is extracted than where it is expelled, and, consequently, that the probability of a second operation being necessary would be greater in such cases, which would constitute another important difference between these two classes of cases, or, as Dr. Simpson admits, would double the hazard.

Of 41 cases given by Dr. Radford, "in 18 turning was performed, in 6 it is presumed to have been so, in 1 the child was drawn by the presenting leg, 16 were terminated by the natural efforts, 1 by the vectis, 1 by the perforator and crotchet." In table 2d, of 14 cases, 2 were terminated by the natural efforts, 10 by turning, 2 by the forceps.

4. The first class of cases in which Dr. Simpson thinks this new method advisable, is where the hemorrhage is excessive, and the os uteri undilated and undilatable. Now, although it is evident that so long as this state continues (fortunately it is rather the exception than the rule), turning is

impracticable, I confess I do not see how the placenta can be easily or safely detached. I put out of the question using any instrument but the finger for this purpose, for I quite agree with Dr. Radford that any other would be extremely hazardous to the mother under such circumstances. And I concur with him that "in those cases of unavoidable hemorrhage which occur before the expansion of the cervix uteri, it would be quite impossible to force the finger along the cervical canal, and reach the edge of the placenta, so as entirely to detach it; and in those cases which occur at the latter part of pregnancy, or beginning of labor, with a rigid os uteri, it appears to me to be out of the power of the operator, with the finger alone, to reach so far as the edge of the placenta." It must also be borne in mind that Dr. Simpson's favorable rate of mortality does not apply to this class, as there are no statistics of such cases.

5. "In premature labors, with an undeveloped os uteri," there will be the same difficulty in detatching the placenta, whether the child be viable or not, and we are in the same ignorance of what would be the result to the mother.

6. In a great number of the cases in Dr. Simpson's tables (23 in 91), as we have seen, the presentation was abnormal, of the shoulder, arm, or hand and head, and in such cases artificial delivery must take place, and it may be a question whether, if we first merely removed the placenta, on account of the exhaustion of the mother, we should not thereby increase the difficulty of turning at a subsequent period.

7. In the cases mentioned by Drs. Simpson, Radford, and Edwards, of distortion of the pelvis, or tumors in the soft parts offering an obstacle to the extraction of the child, the new operation would not be exactly an alternative, but a substitute, as version would be out of the question in most instances, and the doubt remains whether it could be effected if the obstacle were great. If it could, it might facilitate the use of the perforator and crotchet.

8. In cases of extreme exhaustion, where the mother is unable to bear the shock of turning or any additional loss of blood, if the os uteri be dilated or dilatable, and the circumference of the placenta within reach—as the hemorrhage is said to cease after the removal of the placenta—the operation may be admissible for the purpose of gaining time, even with the chance of artificial delivery afterwards.

9. In cases where the flooding is considerable, the presentation natural, and the pains strong (the cases in which the placenta is sometimes expelled before the child), there seems to be no objection to arrest the hemorrhage by the removal of the placenta, leaving the conclusion of labor to the natural powers, either alone or stimulated by galvanism, as Dr. Radford has proposed. To those two classes the results of Dr. Simpson's statistics almost exclusively apply.

I have thus examined with care this very difficult subject, and although I would be far from pronouncing dogmatically upon it, I feel bound in duty to state, that except in the cases I have mentioned, I could not consent to substitute the new method of treatment for the old, and even in those cases I would recommend the very utmost caution.

685. Dr. Robert Barnes has proposed another mode of treatment based upon some very ingenious views.[1] He has divided the uterus into three zones; the lower one, the cervical, being the only portion of the uterus narrower than the child, is the only part dilated by the process of labor, and therefore the only part from which the placenta will be detached by that process. So much of the placenta as may be within this zone will and may

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[1] The Physiology and Treatment of Placenta Prævia, being the Lettsomian Lectures on Midwifery for the year 1857.

be detached, but any portion beyond it will not be so necessarily. So far, I think, he is right. Again, we know, as I have already mentioned, that if the hemorrhage be arrested, it does not always return, from which Dr. Barnes infers that a renewed hemorrhage is always the result of a new detachment of a portion of the placenta. Carrying this view into practice, Dr. Barnes proposes that the cervical portion of the placenta should be detached, with the hope that the hemorrhage will cease and not return. He does not advise this plan for all cases, and the cases in which he has tried it are but few. I must refer my readers to his able work for fuller detail; all I will say at present is, that I rather doubt the fact of an old detachment giving rise to no renewed bleeding, and fearing that the artificial detachment of the adherent after-birth might give rise to a severe additional flooding, I should be afraid to run the risk, especially as by the plug, and, when suitable, turning, we have a mode of prompt delivery by which any great increase of hemorrhage may be avoided. Without denying that it may be suitable in some cases, I should hesitate in recommending it until further experience shall have tested its merits.

["Messrs. Simpson, Radford, and the other gentlemen who advocate the new method in placenta prævia," remarks Dr. Meigs,[1] "very earnestly recommend the prompt separation of the whole of the placenta; and they are persons whose opinions are justly to be esteemed of the greatest weight; but notwithstanding the profound respect with which I receive any statement of theirs, I cannot but think that in any case in which it is possible to detach the *whole* of the placenta, it would be also possible to introduce the whole of the hand, and thus commence at once the operation of turning, which ought to be esteemed as the essential indication of treatment in placenta prœvia, and which the earlier it is done, so much the greater chance does it give both of rescuing the child and saving the woman from fatal losses of blood."

Before the Obstetrical Society of London Dr. Robert Barnes read a paper, April 6th, 1859, giving the history of fourteen cases illustrative of the physiology and treatment of placenta prævia. The following series of therapeutical deductions he believes to be sustained by the result of these cases.

"1. That inflammation of the uterine structures, particularly of the cervix, is especially likely to supervene upon delivery attended by placental presentation; and that the danger of this complication is increased by the forcible dilatation and contusion of the vascular cervix, caused by the introduction of the hand, or by the extraction of the child.

"2. That the greatest amount of flooding generally takes place at the *commencement* of labor, when the os is beginning to expand. That the os is always, from its being near the seat of the placental attachment, highly vascular, and is frequently, at this stage, very rigid. That any attempt to force the hand through this structure, at this stage, either for the purpose of wholly detaching the placenta, or of turning the child, must be made at the risk of injuring the womb; and that the dragging the child through the os when in this condition—even when it has not been necessary to pass the hand into the uterus—is a proceeding affording slender chance of life to the child, and dangerous to the mother.

"3. That the entire detachment of the placenta is not necessary to ensure the arrest of the hemorrhage; and that, therefore, it is not necessary either to wholly detach the placenta before the birth of the child, or, in cases uncomplicated with cross-presentation, to proceed to forced delivery with a view to wholly detach the placenta after the birth of the child.

"4. That, since the dilatation of the cervical portion of the womb must take place in order to give passage to the child, and since, during the earlier stages of this necessary dilatation, hemorrhage is liable to occur, it is desirable to expedite this stage of labor as much as possible.

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[1] [Op. cit.]

"5. That in cases where labor appears imminent, with considerable flooding, whilst the os internum uteri is still closed, the arrest of the flooding and the expansion of the os may be favored by plugging the vagina, and especially the cervix; by the use of ergot; by the stimulus of galvanism to the uterine muscles, or by the method, recommended by Professor Braun, for bringing on labor in puerperal convulsions.

"6. That, since a cross-presentation, or other unfavorable position of the child at the os internum uteri is apt to impede or destroy the regular contractions of the uterus, which are necessary to the arrest of flooding, it is mostly desirable in cases complicated with unfavorable positions of the child, to deliver as soon as the condition of the os uteri will permit.

"7. That, in some cases, the simple use of means to excite contraction of the uterus, such as ergot, rupturing the membranes, the administration of a purgative, or the employment of galvanism, will suffice to arrest the hemorrhage.

"8. That, in some cases where it is observed that the os uteri has moderately expanded—namely, to the size of a crown-piece, or less,—the placenta being felt to be detached from the cervical zone, and the hemorrhage having ceased, it is not necessary to interfere with the course of the labor, now become normal.

"9. That, at the critical period, when the total detachment of the placenta, or forcible delivery are dangerous or impracticable operations, the introduction of the index finger through the os, and the artificial separation of that portion of the placenta which lies within the lower or cervical zone of the uterus, is a safe and feasible operation.

"10. That the artificial detachment of all that portion of the placenta which adheres within the cervical zone of the uterus will at once liberate the os internum uteri from those adhesions which impede its equable dilatation; and by facilitating the regular contraction of this segment of the uterus, favor the arrest of hemorrhage, and convert a labor complicated with placental presentation into a natural labor."[1]

For a very full report of the statistics of placenta prævia, so arranged as to present as far as possible their true bearing upon the several questions involved in a consideration of the proper treatment of the accident, with direct reference to the safety of the mother and child, the reader is referred to the Prize Essay of Dr. I. D. Trask, contained in the 8th vol. of the Transactions of the American Medical Association, page 593.]

The necessary stimulants and support must be afforded, as in accidental hemorrhage, and if the patient be extremely sunk and exhausted, we may have recourse to transfusion.

686. 3. HEMORRHAGE AFTER DELIVERY. — A certain amount of blood is always lost after delivery, nor is this injurious; and it is only when it is so great as to produce an impression upon the constitution and the pulse that it is to be considered as flooding. Of course, in all cases it escapes from the mouths of the vessels, exposed by the partial or entire separation of the placenta, not being closed by firm uterine contraction.

It sometimes, but rarely, takes place when an interval elapses between the expulsion of the head and body of the child, but much more frequently after its birth, before or after the expulsion of the placenta. The presence of a clot or a polypus in the uterus may also give rise to it.

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[1] [Transactions of the Obstetrical Society of London, vol. i., 1860, p. 83.]

The hemorrhage after the expulsion of the placenta may be the result of want of contraction of the uterus; but there are severe and even fatal cases which are caused by a limited rupture of the cervix.

Dr. F. H. Ramsbotham has recently published a series of very interesting cases, in which hemorrhage co-existed with severe after-pains, owing, apparently, to the presence of a firm coagulum in the uterus, which it failed to expel. The remedy consists in introducing the hand and removing the coagula.

I have, in the last chapter, spoken fully of retained placenta and its treatment, which I shall not now repeat, but shall confine myself to the treatment of the hemorrhage, whose effects are similar to those already noticed.

687. Treatment.—Let us suppose, therefore, that the placenta has been extracted or expelled, but that the flooding is not arrested. The first object is to produce a firm and persistent contraction; and to effect this, whilst with one hand we firmly grasp the uterus, with the other cold is to be suddenly applied to the genitals by means of cloths dipped in cold water. The advantage of grasping the uterus is, that we thereby secure an artificial contraction, as it were, until the means employed effect a real one.

Ergot may be given at the same time, and in no case is it more beneficial. Cold enemata and cold drinks are also valuable auxiliaries. If these fail, we may pour cold water from a height upon the abdomen, and the shock will generally succeed in rousing the uterus into action. Dr. Tyler Smith succeeded, as a last resource, by injecting iced water into the uterus,[1] in two cases; and Mr. Chavasse, of Birmingham, speaks highly both of the success and safety of the practice.[2] Compression of the aorta is said to be effectual in some cases. It was introduced by Saxtorph, and has since been recommended by MM. Lentin, Chailly, and others. Dr. Radford recommends galvanism. When all has failed, Dr. Gooch recommends the introduction of the hand into the uterus, for the purpose of exciting it to contract by the irritation. I have no doubt of its success, but it is more hazardous than the other means I have mentioned.

The internal remedies advised in the other forms of hemorrhage (as lead and opium) are equally suitable to this, whether primary or secondary. The restorative treatment is likewise the same.

In all cases where, after a previous labor, the patient has suffered from hemorrhage, I am in the habit of giving half a drachm of the ergot of rye, immediately after the birth of the child, and repeating it if necessary. By this means I have rarely failed to protect the patient against a repetition of the accident. It is right to mention that so far from flooding affording the patient any immunity from subsequent inflammation, I should say that it is not very rarely followed by such an attack.

688. 4. Secondary Hemorrhage.[3] —By this term I understand a loss of blood occurring after the discharge which accompanies a delivery has moderated into the ordinary amount of the lochia. It may occur after six, eight, or ten hours, or at any period within the month.

Of 43 cases recorded by Dr. Collins, the discharge occurred within 12 hours in 40, on the 4th day in 1, on the 5th in 1, and in 1 on the 10th day. In 25 cases recorded by Drs. M'Clintock and Hardy, only 1 occurred so late as the 7th day. In 5 cases given by Drs. Johnston and Sinclair, the bleeding occurred on the 4th day in 2, on the 8th in 1, on the 9th in 1, and on the 21st day in 1 case. Dr. Stevenson met with 1 case on the 10th day;[4]

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[1] Lancet, July 7th, 1849, vol. ii. pp. 6, 693.

[2] Ibid., Dec. 29th. 1849.

[3] I have been much indebted to a valuable and learned essay on this subject by my friend Dr. M'Clintock, in the Dublin Quarterly Journal for May, 1851, to which I beg to refer such of my readers as may be anxious for further details than I have given.

[4] New York Annalist, Oct. 1st, 1848.

Dr. Fergusson 1 on the 13th.[1] Dr. Roberton has given 14 cases; in 1 it occurred on the 7th, in 2 on the 9th, in 2 on the 10th, in 1 on the 11th, in 1 on the 12th, in 2 on the 14th, in 2 on the 16th, in 1 on the 19th, in 1 on the 22d, and in 1 on the 27th day after delivery. In 5 of the cases there was but a single attack; in the remainder the hemorrhage recurred.[2] In Mr. Campbell's case it was on the 14th day.[3]

689. CAUSES. — The causes are various. The retention of a portion of an adherent placenta, after an operation for its removal; the formation of a firm coagulum, which the after pains are not sufficient to expel; the relaxation of the uterine contraction within a limited period; local or general disturbance of the circulation; constipation, according to Moreau; disorder of the liver, according to Dr. Ayre; inflammatory ulceration of the cervix, according to Dr. Bennet; polypus uteri, inversion, disease of the body of the uterus, a minor degree of laceration, and thrombus of the cervix uteri.

Any of these causes may give rise to very serious hemorrhage at an uncertain period after delivery, and the most important point for the attendant, when summoned, is to ascertain to which of these causes it is attributable. The size of the uterus will assist us in deciding the question of the retention of the placenta or a clot, and in most cases some light will be thrown upon the matter by a careful internal examination, added to the previous history. After all, in many cases it is only by the "method of exclusion" that we can arrive at a conclusion as to the nature of the case.

It does not appear that the attack is frequently fatal, except when it is complicated with organic disease. Of Dr. Collins' cases, four died, one of rupture of the uterus, one of sloughing of the vagina, and two from the effects of the hemorrhage.[4] Of Dr. M'Clintock's cases, two died, one from the effects of the hemorrhage, and one of uterine phlebitis.[5] None of Dr. Roberton's cases proved fatal; but he relates two from the practice of his colleagues, Mr. Windsor and Mr. Clough, and quotes one from Madame Boivin, which ended unfortunately.[6]

690. TREATMENT. — Having decided upon the nature of the case, the treatment is not difficult. The application of cold externally, or enemata of cold water, and ergot, are, perhaps, the most valuable means, and the latter will facilitate the expulsion of any portion of the placenta, if loose, or of a clot.

["Iced-water may be injected into the bowels, a quart at once, which is a favorite remedy of my highly esteemed and judicious colleague, Professor B. R. Palmer, who informs me that it has never failed in his hands to excite uterine contraction and arrest the bleeding."[7]]

Dr. M'Clintock speaks highly of the plug, but it must be combined with pressure over the uteres, to guard against internal hemorrhage.

["To attempt," remarks Professor Miller, of Louisville, Ky., "to control hemorrhage from an empty and flaccid uterus, by plugging the vagina, is highly hazardous. We may, it is true, prevent the issue of blood by this expedient, but we can have no assurance that it will not continue to pour from the vessels, and collect in the uterine cavity, until life is exhausted. It is better to contend with an open than a lurking enemy — let the blood, therefore, have an unobstructed channel; we can, then, the more clearly discern our patient's danger — which it is folly to hide from our eyes — and shall be incited to more earnest efforts to save her from impending death."[8]]

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[1] New York Jour. of Med., Sept. 1850.

[2] Phys. and Dis. of Women and Med., p. 365.

[3] Med. Gaz., Oct. 26th, 1849, p. 732.

[4] Prac. Treatise on Midwifery, etc., p 158.

[5] Prac. Obs. in Midwifery, etc., p. 286.

[6] Dis. of Women and Midwifery, p. 365.

[7] [Henry Miller, M. D., of Louisville, Ky. Principles and Prac. of Obstetrics.]

[8] [Principles and Practice of Obstetrics.]

Tincture of the Indian hemp, the oxide of silver, spirits of turpentine, and a blister to the sacrum, are all valuable remedies.

In cases of disease, ulceration, polypus, etc., a selection of these remedies may be used for the purpose of arresting the hemorrhage ; but other treatment will be necessary for those cases, which I have detailed in the volume on Diseases of Women, and need not repeat here.

Inversion of the uterus, and its treatment, will also be found in the same volume.

Mr. Slyman proposes an elastic bag introduced into the uterus, and filled with cold water or air, so as to make pressure.[1]

CHAPTER XXI.

PARTURITION.—CLASS III. COMPLEX LABOR.
ORDER 4. CONVULSIONS.

691. The next complication I shall notice is that affection of the nervous system termed convulsions —*i. e.*, a convulsive seizure of the entire body and extremities, omitting those partial attacks which we see occasionally, although they may be of a convulsive or spasmodic nature. The complication is a very frightful and a very dangerous one, and may occur either *during gestation, immediately before, during, or after parturition.*

The variety of opinions and methods of treatment which have been put forth, seems mainly to have arisen from confounding the different species of convulsion : and in order to avoid this, I shall describe three varieties—the *hysteric*, the *epileptic*, and the *apoplectic* convulsion.

692. 1. HYSTERIC CONVULSIONS.—This variety is confined to the period of gestation, and is more frequent during the early months than subsequently. Females of a nervous or hysterical constitution are the most obnoxious to the attacks.

CAUSES.—Want of sleep, or excessive fatigue, may give rise to hysteric convulsions, or they may be caused by disordered digestion.

693. SYMPTOMS.—The attack is generally preceded by a tightness about the throat, by sobbing, or repeated attempts at swallowing. The patient then becomes still and motionless, or may roll about from side to side. The hands are frequently pressed upon the breast, or carried to the neck, as though to remove some obstruction. The face is generally, though not always, pale, and not distorted; no froth issues from the mouth, nor are there the convulsive motions of the lower jaw, by which in epilepsy the tongue is sometimes severely bitten. In many cases the muscles of the back are violently contracted, which Dr. Dewees thinks a pathognomonic symptom. The patient is not insensible, though she cannot express her feelings or wishes. After this state has continued for a longer or shorter time, the sobbing becomes more violent, or the patient screams and sheds tears, and the fit thus terminates. A great quantity of limpid urine is also discharged.

[1] Lancet, Jan. 13th, 1849, p. 87.

The paroxysm may be a single occurrence, or return after a time, with the same phenomena.

It does not generally influence the progress of gestation, though I have seen premature labor take place during the paroxysm. The mother's health may be rendered rather more delicate, but it is not seriously compromised by the disorder.

694. DIAGNOSIS. 1. *From epileptic convulsions.*—The body is but slightly contorted; there is no complete insensibility; there is no frothing at the mouth, nor biting the tongue, nor stertorous breathing; and after the fit is over, the patient recovers her usual state—the reverse of all which symptoms occur in epileptic convulsions.

2. *From apoplectic convulsions.*—In these the patient loses consciousness and voluntary motion at first, and ultimately all motion ceases; this is not the case in hysteric convulsions; besides which, in the latter the breathing is not stertorous, and the patient soon recovers.

695. TREATMENT.—If the pulse be quick (which is not ordinarily the case), or the head ache, venesection may be practised, or a few leeches be applied to the forehead; but this is rarely necessary. In most cases, antispasmodics combined with diffusible stimuli (valerian or assafœtida, with ammonia), will relieve the patient. Volatile alkali, held to the nostrils, is useful; or cold water dashed upon the face.

When the paroxysm is over, a moderate dose of opium may be given; and, after a sound sleep, the patient will find herself nearly restored. The stomach must be attended to. Tonics may be given if necessary, and aperient medicine.

696. 2. EPILEPTIC CONVULSIONS.—This variety is by far more frequent than either of the others.

697. STATISTICS.—*Frequency.*

Authors.	Total Number of Cases.	Convulsions.
Dr. Bland	1,897	2
Dr. Jos. Clarke	10,387	19
Dr. Merriman	2,947	5
Dr. Granville	640	1
Dr. Cusack	898	6
Dr. Maunsell	848	4
Dr. Collins	16,654	30
Dr. Beatty	399	1
Dr. Ashwell	1,266	8
Dr. Mantell	2,510	6
Dr. Churchill	600	2
Drs. Hardy and M'Clintock	6,684	18
Dr. F. H. Ramsbotham	68,435	67
Mr. Earle	4,320	8
Mr. Rose	600	2
Mr. Bailey	2,819	11
Dr. Toogood	1,135	1
Dr. J. Lee	850	2
Mr. K. Watson	800	4
Dr. Copeland	1,290	8
Dr. Arneth	6,527	13
Mad. Boivin	20,357	19
Mad. Lachapelle	88,000	61
Mr. J. Thompson	8,800	6
Drs. Johnston and Sinclair	18,748	68
Dr. Hall Davis	7,802	5

Thus we have 347 cases of convulsion in 214,663 cases of labor, or 1 in about 618¾.

On the whole, the *mortality* is considerable, though probably much less so than formerly. Jacob states that in his time scarcely any survived. Dr. Parr, in his Med. Dictionary, that six or seven out of ten die. Dr. Hunter, that the greater proportion were lost.

Authors.	Cases of Convulsions.	Mothers lost.
Mr. Giffard	4	2
Dr. Smellie	8	2
Mr. Perfect	14	5
Dr. Bland	2	0
Dr. Jos. Clarke	19	6
Dr. Newman	36	8
Dr. Ramsbotham	26	10
Dr. Maunsell	4	2
Dr. Collins	30	5
Dr. Beatty	1	0
Dr. Churchill	2	0
Dr. Mantell	6	2
Drs. Hardy and M'Clintock	13	3
Dr. F. H. Ramsbotham	43	3
Dr. Arneth	13	4
Dr. Meigs	20	3
Dr. Huston	13	2
Mr. J. Thompson	6	0
Drs. Johnston and Sinclair	63	13
Dr. Hall Davis	5	0

Thus, out of 328 cases, 70 mothers were lost, or about 1 in 4½.

Women of all temperaments may be attacked, but it is more common, as Dr. Collins has remarked, "in strong plethoric young women with their first children; more especially in such as are of a coarse make, with short thick necks."[1] Dr. Ramsbotham has stated that "women with large families are equally or perhaps more liable to be assailed." This, however, is not borne out by numerical investigation, for of thirty-six cases related by Dr. Merriman, twenty-eight were with first children. Of Dr. Ramsbotham's own cases, more than two-thirds were with first children; of Dr. Collins' 30 cases, 29 were with first children; and of Dr. Johnston and Sinclair's 63 cases, 49 were primiparæ.

698. CAUSES.—Various and very obscure have been the explanations of the causes of puerperal convulsions. Dr. Locock thus enumerates them: "The immediate causes of puerperal convulsions are often very obscure. They appear sometimes to depend upon a loaded state of the brain; at other times the brain appears to be influenced by distant irritation, either in the uterus or digestive organs; and, again in some cases, puerperal convulsions are induced apparently by a peculiar irritability of the nervous system. It has been remarked, that there has been a greater disposition to puerperal convulsions in those patients who have been in early life subject to convulsive attacks, particularly of an epileptic character; and also in those who have suffered similarly in former labors, and have omitted those measures usually employed as precautions. That the uterine organs are in some way particularly implicated, is evident from the convulsions being of a character which may be said to be peculiar to the state of either pregnancy or parturition."

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[1] Prac. Treatise on Midwifery, p. 199.

"The immediate attack may be brought on by a loaded or disordered stomach, or by food, however small in quantity, of an indigestible kind. Some substances (shell-fish for instance) have been found very frequently to induce convulsions in the puerperal condition, when at other times they may have been taken by the same individual with perfect impunity. A sudden fright, afflicting intelligence, or any unexpected or depressing mental emotion, may excite the paroxysm; hence it has been long remarked, that unmarried women are more particularly likely to be sufferers from convulsions, from the shame and distress under which their children are usually born. The violent straining caused by labor pains, from the disturbance of the frame by the earlier uterine contractions, causing a temporary rush of blood to the head, will sometimes bring on convulsions."[1]

The application of Dr. Marshall Hall's theory, however, by Drs. Thompson, Murphy, and Tyler Smith, has thrown much light upon the matter. The former gentleman insists that no injury to the cerebrum or cerebellum can cause convulsions, so long as the true spinal system is not involved, in which Dr. T. Smith agrees with him. He then states that the proximate cause of puerperal convulsion consists in a morbid irritation of the true spinal system, and more especially of the medulla oblongata, propagated to it from the mucous surfaces, through the incident nerves of the excito-motor system.[2]

Dr. Murphy[3] enumerates, among the proximate causes, morbid irritation of the uterus from hyperæmia or anæmia, and morbid irritation of other organs, and regards the whole as a beautiful illustration of the reflex nervous function; the peripheral nerves that supply the affected organ rapidly communicating their irritation to the spinal system, which, as an excito-motor centre, radiates the irritation over the whole of the voluntary muscles, and the muscles of respiration. Even the involuntary muscles, as the uterus and heart, do not escape.

Dr. Tyler Smith, in his admirable work, has entered into a most elaborate investigation of the causes of convulsions: after which he observes:—"In conclusion, to give a summary of the whole subject, the true puerperal convulsion can only occur when the central organ of this system, the *spinal marrow*, has been acted on by an excited condition of an important class of its incident nerves, namely, those passing from the uterine organs to the spinal centre, such excitement depending on pregnancy, labor, or the puerperal state. While the spinal marrow remains, under the influence of either of these stimuli, convulsions may occur from two series of causes; those acting primarily in the spinal marrow, or *centric* causes; and secondly, those affecting the extremities of its incident nerves; causes of eccentric or peripheral origin.

"I. Causes acting immediately on the central organ:—

1. Pressure exerted on the medulla oblongata by congestion, coagula, nervous effusion within the cranium.
2. Loss of blood.
3. Morbid elements in the blood.
4. The influence of emotion.

"II. Causes acting on the extremities of excitor nerves:—

1. Irritation of the incident spinal nerves of the uterus and uterine passages.
2. Irritation of excitor nerves within the cranium.

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[1] Cycl. of Pract. Med. Art.: Puerperal Convulsions.

[2] Essay on the Epileptic form of Puerperal Convulsions. Ranking, vol. viii. p. 318.

[3] Lectures in Med. Gazette, Jan. 1849.

3. Irritation of the incident spinal nerves of the rectum.
4. Irritation of the ovarian nerves.
5. Irritation of the gastric and intestinal branches of the pneumogastric nerves.
6. Irritation of the incident spinal nerves of the bladder.
7. As probable causes may be enumerated, irritation of the cutaneous nerves of the mammæ, and of the hepatic and renal branches of the pneumogastric.

"Though the subject distinctly admits of this division, several causes may act together, and centric and eccentric causes may be in operation at the same time. I have made no attempt at a division into predisposing and exciting, proximate and remote causes, as other authors have usually done, because it is evident that a cause which, in one case, is the exciting or proximate, may, in another, be the predisposing or remote cause."[1] Subsequently, Dr. Tyler Smith endeavors to explain the operation of the causes, and to trace the gradual progress from the slight commencement up to the completion of the convulsive paroxysm: but the investigation, though able, and full of interest, is too long for quotation, and I must refer my readers to his work, with an assurance that the perusal of the whole will abundantly repay them.

Among the most common *exciting* causes are usually enumerated intemperance in eating and drinking; mental emotion; fright, as in the case related by Denman, of a lady who was going on a party of pleasure, and whose carriage broke down; she was near the time of her lying-in, and was very much frightened, though she received no apparent injury. When she fell into labor, this was preceded by convulsions, in which she died undelivered.[2]

Mr. Robbs has related a case[3] in which the convulsions seem to have been owing to the irritation of worms; at least, they ceased on the expulsion of two large lumbrici.

Atmospheric influence, according to M. Dugès,[4] appears to have some peculiar effect in producing the disease, so that it assumes the character of an epidemic. This is confirmed by the observation of Dr. Ramsbotham, who observes:—"I have repeatedly remarked, among the numerous patients of the Royal Maternity Charity, as well as among others to whom I have been accidentally called, that several cases have occurred soon after each other. Whether this fact ought to be attributed to mere chance, or to the agency of some general principle upon the female system, I must leave to others to determine in future; but I am inclined to suspect that it may be ascribed to the latter principle. And here I may be allowed to observe, that I have witnessed the occurrence of several cases during warm weather; at a time when the clouds have been charged with electric fluid; when atmospheric appearances have threatened a thunderstorm, and when, perhaps, they have ended in one."[5] And most practitioners will probably have had occasion to remark the occurrence of several cases about the same time, as if they depended upon some general cause.

699. In considering the exciting causes of the disease, we cannot overlook the condition in the urine. Hamilton[6] and Demanet[7] first stated that puerperal convulsions were liable to be preceded by anasarca, and their observations were confirmed by the highest authority. Dr. Simpson and Dr. Lever[8] were the first to connect this dropsy with that condition of the kidney which gives rise to the secretion of albumen, and since their time,

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[1] Parturition and Obstetrics, p. 806.
[2] Introd. to Midwifery, p. 429.
[3] Med. Gazette, Sept. 21st, 1849.
[4] Dict. de Méd. et de Chir. Prat., vol vi. p. 541.
[5] Pract. Obs. in Mid., vol. i. p. 250.
[6] Duncan's Annals of Med., vol. v. p. 318.
[7] Recueil Périodique de la Société de Méd., vol. ix. p. 110.
[8] Guy's Hospital Reports, 1843.

the researches of Cahir and Bouchut, Rayer, Depaul, Cazeaux, etc., have confirmed and extended their observations. That in a large proportion of cases of convulsions there is albuminuria, with or without anasarca, there can be no doubt; but, on the other hand, albuminuria may occur without convulsions, and convulsions without albuminuria. For example, Dr. Blot[1] found albumen in the urine of 41 pregnant women out of 205, and chiefly in primiparæ; and Dr. Litzman[2] examined the urine of 131 females, 79 during pregnancy, 80 during labor, and 80 after delivery; albumen was present in 37, and absent in 95; of the 37, 26 were primiparæ. What is the exact relation between the two is difficult to say precisely. I believe, with Dr. Simpson, that they both stand in the relation of effects of another cause, viz., "a pathological state of the blood, to the occurrence of which pregnancy may some way dispose;[3] or it may be that the excretion of albumen so discomposes the equilibrium of the component parts of the blood, that in their disproportion they give rise to these peculiar morbid effects. This seems to be the opinion of Dr. Braun,[4] who terms the disease "Uræmic Eclampsia," from "Uræmic intoxication of the blood," and he considers it analogous to the first stage of Bright's disease. Frerichs has pointed out the altered condition of the blood in pregnant women, viz., the increase of water and of fibrin, diminished quantity of albumen, diminution of the red and increase of the white corpuscles, as a subordinate cause.

Dr. Cormack has published an excellent paper on the connection between renal congestion and puerperal convulsions.[5] He considers that in many cases the latter are the toxicological results of non-elimination of the excretions of the blood, and that in the greater majority of cases this non-elimination depends upon renal congestion, caused by the pressure of the gravid uterus.

Many authors have assumed the previous occurrence of epileptic, as a predisposing cause of puerperal convulsions, as I did myself in the previous editions of this work, but I am induced to think this very doubtful. In the work from which I have quoted, Dr. Tyler Smith observes that "the suspected affinities between epilepsy and puerperal convulsions deserve attention. It would seem *à priori*, that epileptics, or persons who have been subject to convulsions during infancy, would be far more liable than others to attacks of convulsion during the puerperal state. It would also seem probable that patients suffering from puerperal convulsion should become subsequently liable to epileptic attacks. But experience does not positively support either of these probabilities."[6] In a more recent publication he mentions, that in fifty-one pregnancies occurring in fifteen epileptic subjects, only two had puerperal convulsions,[7] and the experience of Drs. Hardy and M'Clintock confirms this view.

Of those cases of severe epilepsy before marriage which have come under my care, in one only was there any attack during gestation or parturition; whilst in the numerous cases of puerperal convulsions I have seen, I have not known one in which the convulsions returned in the absence of pregnancy.

There is a curious instance on record of periodical convulsions during the time of gestation only. "The wife of a citizen of Ferrara, twenty years of age, of a bilious constitution, and the mother of three children, was attacked with *periodical epilepsy* whenever she conceived, and sustained a paroxysm of that malady once a fortnight during the whole of her gestation; but as soon as she was delivered, the disease left her. Its occurrence, therefore, was always to her a sign that she had become pregnant."[1]

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[1] L'Union Médicale, 10 Oct. 1852.

[2] Deutsche Klinik, May, June, July, 1850.

[3] Ed. Monthly Journal, Oct. 1852, p. 369.

[4] The Uræmic Convulsions of Pregnancy, Parturition, and Childbed. Translated by Dr. Matthews Duncan. A most valuable little work, to which I beg to refer my readers.

[5] Lancet, April 13th, 1850.

[6] Parturition and Obsterics, p. 328.

[7] Med. Gazette, 1849, vol. ix., p. 1074.

I have seen a case something like this. A lady was attacked by convulsions of an epileptic character the first time she conceived, and they were repeated at the moment of quickening. She escaped an attack during her second pregnancy, but was seized at the moment of conception the third time. She passed through her labor without the least threatening of convulsion.

700. SYMPTOMS.—The symptoms of epileptic convulsions resemble very closely, if they are not identical with, those of ordinary epilepsy. In the majority of cases there are certain premonitory symptoms. The patient, for some time previous, suffers from pain in the head, giddiness, confusion, ringing noise in the ears, obscure vision, temporary loss of sensation, rigors, nausea, or even vomiting. The face is flushed, and the eyes injected. Dr. Hamilton, senior, mentions as peculiar, an intense pain in the forehead ; and Dr. Denman, a severe pain in the stomach, and these, he thinks, are the worse kind of cases. Osiander has noticed a tumid state of the hands and face preceding the attack. Most practitioners are familiar with a dropsical swelling of the face alone, or face and upper extremities, which is not uncommonly followed by convulsions, and which we may regard undoubtedly as a precursory symptom, if the urine be at the same time albuminous. In some few cases, however, there are no precursory symptoms ; the patient has no warning until the moment before she becomes insensible. The "aura epileptica" is seldom felt.

As the attack approaches, these symptoms are aggravated ; the pupils become dilated, the face more injected, the eyes fixed, and the patient loses consciousness.

During the attack, the face is swollen, of a dark red or violet color, and distorted by spasmodic contractions ; the eyes are agitated, the tongue protruded, and the under jaw repeatedly closed with force, so as to wound the tongue. A quantity of froth is ejected from the mouth, which is generally drawn more to one side of the face than the other. The muscles of the body are thrown into violent and irregular action ; the limbs are jerked in all directions, and with such force that it is sometimes difficult to keep the patient in bed. The respiration is at first irregular, and being forced through the closed teeth and the foam at the mouth, has a peculiar hissing sound ; it subsequently becomes nearly suspended. The pulse is quick, and, at the beginning, full and hard, but afterwards small and almost imperceptible. The body participates in the purple color of the face. The urine and fæces are often passed involuntarily. This terrible paroxysm, however, is not of very long duration. After a period varying from five minutes to half an hour, the convulsive movements become less violent, and gradually subside ; the countenance is less distorted, and assumes a more natural and placid appearance ; the eyelids close, the respiration becomes more regular, though still sibilant, and the circulation is restored, the pulse becoming more perceptible, though still very quick ; the patient rests quietly in bed, and the paroxysm has terminated for the time.

During the interval, the patient's condition is very variable. She may partially recover consciousness, so as to recognize persons around her, and to be aware of something extraordinary having happened, without knowing what, and without being able to express herself clearly. In other cases, the return of intelligence (but without recollection) may be complete until the approach of the next fit, accompanied with great weakness, headache, and confusion. These are the more favorable cases. Others, again, remain in a state of total insensibility, almost approaching to coma or asphyxia, with sibilant or stertorous breathing, and without muscular motion, or with a restless throwing about of the body and extremities. This calm is, however, of no very long duration; it may be half an hour, or two hours, but sooner or later the paroxysms return, to be succeeded by an interval which in its turn gives place to a paroxysm. I have known as many as eighteen paroxysms occur in twenty-four hours.

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[1] Comm. by Lanzoni, Ephem. Germ., dec. ii. an. 10, p, 160.

701. The urine, as I have already mentioned, is in the large majority of women, albuminous. Dr. Lever remarks, "I have carefully examined the urine in every case of puerperal convulsions that has since come under my notice, both in the Lying-in Charity of Guy's Hospital and in private practice, and in every case but one, the urine has been found albuminous at the time of the convulsions." And this has been confirmed by Simpson, Sabatier, Legroux, Richelot, Blot, Mascarrot, Braun, and others. More recent researches have thrown a good deal of light upon the occurrence of this renal affection. De Villiers and Regnault[1] observed it as early as the sixth month; Litzmann not till the eighth. The most characteristic symptom is dropsy of the hands, arms, and face; but dropsy does not necessarily co-exist. "The quantity of albumen is usually very conspicuous, and increases as the time of delivery approaches. In proportion to the intensity and duration of the morbid process in the kidneys, are found casts of the uriniferous tubes in greater or less quantity, the epithelium lining them being sometimes normal, sometimes in a state of fatty degeneration. In the milder cases, the tube casts are often found just at delivery, or soon after. Careful examination will probably, in all cases, detect a not inconsiderable diminution of the urine."[2] Dr. Cormack and Dr. Litzmann attribute the albumen to mechanical pressure upon the kidney, by the enlarged uterus producing congestion of that organ, and they adduce as an argument the greater frequency of albuminuria in primiparæ. Neither regard it as the consequence of granular degeneration; and certainly, the temporary character of the phenomenon is not consistent with structural disease. Dr. Seyfert attributes it to the disturbance of respiration and circulation. According to most observers, the albumen disappears within a short time; often forty-eight hours after delivery.

The termination of the attack varies in different patients; some remain in a state of half-stupor and great exhaustion for hours or days, and gradually recover. Other patients become maniacal, and may even remain so for a long time, and ultimately recover. I had a patient who remained in a state of mental derangement for several months before she was restored to health. In a few cases the patient continues comatose, and gradually passes into a state resembling apoplexy, and dies.

It is not always, however, that the recovery is complete. Sometimes the patient lies apoplectic, or in a state analogous; or she is deaf, or blind, or incapable of speaking, or both; or the limbs are paralyzed. In fine, it seems as if the sensorium had received some permanent injury, the corresponding parts of the body suffering in consequence.[3] Cases of partial or complete paralysis are recorded by Lever, Simpson, and others, as a termination of convulsions.[4]

702. I have already mentioned that convulsions may attack the patients either *during pregnancy*, at *the time of parturition*, or *after delivery*.

It will be necessary to say a few words upon its occurrence at each of these periods.

703. *Pregnant* women are more especially obnoxious to this disease

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[1] Arch. Gén. de Méd. 1848. Recherches sur les Hydropisies chez les femmes enceintes.

[2] Association Journal, Jan. 21st, 1853, p. 64.

[3] Blundell's Obstetricy, p. 638.

[4] Churchill's Dis. of Women. Chap. Paralysis in Childbed.

during the latter two months of gestation, though it may occur at an earlier period, and at irregular intervals. The nearer the patient is to her confinement, the greater the risk of an attack, on account of the extreme distention of the uterus, and its increased irritability.

Although the beginning of labor may not be detected, either by an internal or external examination at the outset of these attacks, yet during its continuance labour may commence and run a natural course. In such a case, the fits will be found synchronous with uterine contractions, though not recurring with each.

In many cases, however, the uterus remains perfectly quiescent, and gestation may be carried on for a time longer. In almost all cases the child is still-born, often putrid; but whether its death preceded the convulsions, or resulted from them, is not easily determined. When the former is the case, may we not attribute the convulsions to the dead child acting in some sort as a foreign body? Dr. Ramsbotham observes, "When the result proves thus satisfactory, the convulsions seldom return; but the woman rarely completes her full period of gestation. The process of labor commonly commences within the space of a few days; sometimes within that of twenty-four hours. Its progress is as regular and natural as if no previous derangement had taken place; but the child is too frequently still-born, and occasionally shows marks of approaching putrefaction."[1]

[Instances occur of convulsions happening at each succeeding pregnancy, and persisting until abortion takes place. This is one of the greatest afflictions that can befall the married female. "I have witnessed," says Dr. Huston, in a note to a former edition, "the attack twice in the same lady, with only an interval of three months, both times terminating, as remarked, in abortion. She was a remarkably delicate woman, of great nervous impressibility. During the attacks she had no frothing at the mouth, nor stertorous breathing, but after recovery, was unconscious of all that had passed. She was bled freely at the commencement of the first attack, because of pain in the head, and had a tedious recovery; the next time, she was put under the use of excitants,—sinapisms, wine whey, camphor, morphia, etc.,—and recovered rapidly. The symptoms were very similar in both attacks: as the more prominent of the convulsive phenomena subsided, those of a hysterical character, such as crying, laughing, etc., became more prominent."]

The labor runs a natural course generally, and in a fair proportion of cases the mother recovers tolerably well, though there are startling exceptions, as in the following instance: "A lady, in the end of her pregnancy, was seized with convulsions; her attendant was sent for, and decided that there was no indication of labor, and that a stay was unnecessary. The midwife left the house, and returning early the following morning, the patient was found dead; the child, too, the birth of which no one seems to have suspected, lay lifeless beneath the clothes."[2]

When convulsions occur at the commencement of labor, it might naturally be attributed, in some cases at least, to mal-presentation of the child; but this is not the case. Mal-presentation is observed very rarely in cases of convulsions.

704. *During labor*, the return of the paroxysm takes place at the commencement of a labor pain, although not with every pain. There is a greater expression of suffering from the uterine contraction than from the convulsion. The symptoms I have described appear to be more intense when the attack comes on during labor than during gestation. The uterine contractions do not appear to be impeded by the fits; the labor generally

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[1] Ramsbotham, Pract. Obs. in Midwifery, p. 641, note.

[2] Blundell's Obstetricy, p. 641, note.

runs a natural course in the usual time, if not terminated by art; neither is it necessarily fatal to the infant, although there is great danger.

It is remarkable, and not easily explicable, that after the convulsions have ceased, and the labor is over, there is a great tendency to abdominal inflammation, adding fearfully to the mother's risk. Denman, I believe, was the first to point out this fact, which Dr. Collins and others have confirmed; and which should be remembered in the treatment.

705. When the patient is attacked by convulsions *after delivery*, they generally occur from two to four hours after the birth of the child, sometimes later. There can be little hesitation in attributing them to some injury received by the brain or nervous system during labor, though we may not be able to specify the particular mischief. It does not, however, depend upon the length or difficulty of the labor; they occur as frequently after natural labor.

The loss of blood at the time of delivery does not necessarily prevent the occurrence of the fit, though it adds to the danger by the debility it occasions.

Dugès considers cases of convulsions after delivery to be more tractable than any others, whilst Dr. Ramsbotham states exactly the contrary. I should say that the cases where the convulsions occur during labor, and continue afterwards, are the least manageable; next to these the attack during labor only; then, those after delivery; and lastly, the most favorable are those which occur during gestation.

After recovery from the consequences of the attack, the patient may enjoy her usual health, and her subsequent pregnancies do not appear to be very liable to similar attacks.

706. MORBID ANATOMY.—In the majority of cases, a *post-mortem* examination affords but little information. In many instances there is no deviation whatever from the healthy state of the brain,[1] in others, according to Braun, we find anemia, œdema, and diminished consistence. Sometimes the vessels of the brain are turgid with blood; and in other cases there is a quantity of serum effused on the surface and base of the brain, or into the ventricles. The heart is generally flaccid and empty, and the lungs of a pale color. Some fluid is occasionally found in the pleura, or pericardium. Traces of inflammation have also been discovered in the peritoneum. In a few cases the spleen is unusually large and the kidneys congested. Dr Braun states that they may exhibit one or other stage of the three forms of Bright's disease. He has given a very minute account of the appearance to be observed, but it is too long for insertion, and I must refer the reader to his work.

707. DIAGNOSIS.—1. *From hysteric convulsions.*—In the attack I have just described, there is a *total loss of consciousness*, great muscular action, frothing at the mouth, frequent recurrence of paroxysms, and incomplete restoration or total insensibility during the intervals. In hysteric convulsions, on the contrary, the patient scarcely loses consciousness, exhibits only moderate spasmodic action, has no frothing at the mouth, does not suffer from a frequent recurrence of the fits, and recovers shortly after each. The sobbing, sighing, weeping, and screaming of the hysteric convulsions are also peculiar to it.

2. *From apoplectic convulsions.*—In epileptic convulsions, the whole body is thrown into violent spasms, which are repeated, with intervals of quiescence, and often of partial return of sense. The breathing is rather sibilant than stertorous, and the muscles preserve their tone even during the

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[1] Bouteilleux, Thesis, Paris, 1816. La Chapelle, Traité des Accouch., vol. iii. p. 23. Cruveilhier, Distribution des Prix à la Maternité, Paris, 1888, p. 81. Baudelocque, Thesis, p. 65. Ciniselli, Ann. Univ. di Med., vol. lxix. p. 472.

intervals; whereas in apopletic convulsions, the spasmodic movements occur at the commencement, and are not repeated; sense and sensibility are totally lost, the breathing is stertorous, and the muscles lose all power, so that the arm when raised, and allowed to fall, does so like that of a person recently dead.

708. PROGNOSIS.—On the whole, the mortality is considerable, though probably much less so than formerly. Jacob states that in his time scarcely any survived. Dr. Parr, in his Medical Dictionary, that six or seven out of ten die. Dr. Hunter, that the greater proportion were lost. And we have found that about one in four and a half are lost.

709. TREATMENT.—The division of convulsions into sthenic and asthenic is of great value as regards the treatment. When the patient is pale, exsanguined, and weak, it is clear that much caution must be used in abstracting blood. Of course it may be advisable, but our main reliance must be upon counter-irritation to the head and neck, cold in moderation, calomel, opium, and, I believe, upon anæsthetics. In the sthenic form, when the head is hot, the face flushed, and the pulse full, firm, and frequent, as soon as possible after the convulsion, the first thing to be done is to take away blood from the arm or temporal artery, largely, and in a full stream. If the paroxysms continue, this may be repeated. Denman took forty ounces and Blundell seventy ounces of blood from a patient under these circumstances. We are not to be deterred from a free use of the lancet by the absence of immediate relief—the benefit is rather in the ultimate and early recovery of the patient, than in the immediate arrest of the paroxysms. "The quantity likely to suffice for the relief of a case of only threatened convulsions might amount to between twenty and thirty ounces; but if the convulsions are supposed to have been long established, or to have taken place very suddenly, the practitioner would have to take away perhaps thirty or forty ounces of blood, or even *fifty*, in cases of great intensity of the symptoms. The rule should be, that the pulse must be reduced into a state of mellowness and softness before the arm is allowed to be tied up. In a few extreme cases, in which the author has from time to time been consulted, he has considered it necessary to order a second bleeding, after the lapse of two or three hours subsequently to the former one. But he has never, that he recollects, recommended for the second bleeding the abstraction of more than fifteen ounces of blood."[1] Another good effect from venesection is the prevention of the abdominal inflammation, to which we have seen that the patient is exposed subsequently. If there be any objection to repeating the venesection, leeches may be applied; or if the patient be sufficiently quiet, the nape of the neck may be cupped. Dr. Braun is strongly opposed to bleeding in anæmic eclampsia, as not only having no good effect, but as producing irreparable injury.

[There can be no doubt that, under the circumstances described by Dr. Churchill, the employment of blood-letting to an extent sufficient to produce a decided effect upon the pulse, is strongly indicated in the commencement of the attack of puerperal convulsions. It acts beneficially by relieving the surcharged condition of the cerebral vessels, moderating the severity of the pressure to which they are subjected during the convulsive paroxysm, and thus diminishing the danger of rupture and effusion; it, also, removes the counter pressure from the medulla oblongata. While, however, blood-letting is often a sufficient remedy for simple convulsions depending upon a turgid condition of the blood vessels of the brain and of the medulla oblongata and spinalis, no little judgment and discrimination are required, not only to keep it within safe bounds in the cases in which it is indicated, but to detect those circumstances under which it will be more likely to prove injurious than beneficial. In cases of puerperal convulsions occurring in delicate anæmic females, no matter what may be the character of the symptoms by which they are attended, blood-letting—even one copious bleeding, but especially repeated bleedings—would tend to rather augment than to relieve the frequency and violence of the paroxysms. With the great majority of practitioners, in the management of puerperal convulsions, as has been properly remarked by Dr. C. A. Lindsley,[1] to bleed is the rule, absolute and imperative — no matter what is the condition of the patient. No effort is directed to discover any existing cause of spinal irritation and to resort to the appropriate means for its removal — whether indigestible food in the stomach, unaccumulation of hardened fæces in the bowels, or of urine in the bladder. The condition of the uterus and the state of the vascular system and its contents are alike overlooked. The rule is absolute—to bleed boldly and fearlessly. Such rank and rash empiricism is altogether inexcusable — under its influence it is very certain that blood-letting has been practised under circumstances where it should have been entirely avoided, and that, in cases where within proper limits it was called for, it has been carried to a most injurious excess.

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[1] Davis's Obstetric Medicine, vol. ii. p. 1027.

"It would appear," Dr. Lindsley remarks,[2] "that after the circulation is reduced, either by proper depletion, or from any other cause, to somewhat below par, blood-letting acts no longer as a sedative, but becomes itself a most certain irritant of the spinal marrow. The *continuance* of convulsions, therefore, is not a reliable indication for further bleeding; but the state of the circulation in the interval of the fits, is the only proper criterion, regard being had to the different effects of an engorged and an empty state of the spinal vessels."]

A strong purgative (calomel and jalap, for example) should next be administered, as from the free evacuation of the bowels great benefit is generally derived; and it may also excite uterine contractions, and hasten the delivery.

[Numerous observations, as is well remarked by Dr. Lindsley,[3] attest the fact that large accumulations in the stomach or intestines, whether of food, of fæces, or the presence of worms or of foreign bodies, may excite convulsions in the puerperal female in consequence of the irritation they induce being transmitted to the central organ by reflex action. Whenever, therefore, such offending matters are found to exist, their prompt removal is obviously demanded. But the manner in which this is done is important. There can be but little difference between irritating drugs and irritating fæces, and yet the most drastic purgatives are often administered, with the effect too often of only thus changing one cause of irritation for another. It is but fair to presume that copious injections of water simply, would be quite as effectual, and vastly safer, inasmuch as they are more rapid in their effect, and leave nothing to irritate the intestine after their mission is accomplished. If necessary, their action may be assisted by the addition of castor oil or turpentine. If an overloaded stomach or undigested food is suspected to be the cause of the convulsive paroxysms, an emetic of sulphate of zinc should be administered. If the patient, however, is plethoric, venesection should always precede the emetic, to guard against any injury from the increased distension of the cerebral vessels during the act of vomiting.

Mr. Vines mentions an instance of puerperal convulsions in which, after resisting for two days all the usual remedies, including the delivery of the child, the paroxysms ceased immediately upon withdrawing from the bladder five and a half pints of turbid and highly ammoniacal urine. This case shows the necessity of attention to that condition of the urinary bladder in all cases of eclampsia.]

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[1] [Proceedings Connecticut Medical Society, A. D. 1858.]

[2] [Loc. citat.]

[3] [Op. citat.]

The head may then be shaved, and cold lotion or ice applied. Denman[1] speaks highly of cold affusion. He says, "On a patient in convulsions who had been bled, and for whom many other means had been fruitlessly used, I determined to try the effect of cold water. I sat down by the bed-side, with a large basin before me, and a bunch of feathers. She had a writhing of the body, and other indications of pain, evidently occasioned by the action of the uterus before the convulsions; and when these came on, I dashed the cold water in her face repeatedly, and prevented the convulsions. The effect was astonishing to the bystanders, and indeed to myself. On the return of the indications of pain, I renewed the use of the cold water with equal success; and proceeded in this manner until the patient was delivered, which she was without any more convulsions, except once when the water was neglected.

[Dr. Lindsley,[2] also, suggests the application of cold water to the head. Applied in a continued stream, it is adapted to lessen the distended state of the cerebral blood vessels, and thus relieve the counter pressure upon the medulla oblongata. In the form of douche it would tend to excite an inspiration, and thus dilate the glottis. When the cold water is applied along the spine it should be continuous — the intermittent application excites instead of allaying irritation.]

A warm bath has been recommended, but besides that its value is doubtful, it would in most cases be very difficult to administer it.

After the lapse of some time, the head and nape of the neck may be covered with blistering plaster, as counter-irritation will materially further the restoration of the patient.

When, after copious bleeding and purging, the attack is somewhat subsiding, it has been recommended to give an opiate. Considerable difference of opinion has existed upon this point, owing, I think, to the different parties not specifying with sufficient accuracy the time at which it should be administered, and the cases suitable for it. Under the circumstances I have mentioned, it seems to be the opinion of the highest authorities that it may be of service. Dr. Collins remarks, "Many of our best writers have actually condemned the use of opium in convulsions, stating it to be most injurious — some even destructive. Ample experience has convinced me that it is not only harmless, but *highly beneficial* in those cases where the fits *continue after delivery*. And I should hope the cases adduced will prove satisfactorily that it is also useful under many other circumstances, when proper steps had been previously taken. Its combination with tartar emetic, and and occasionally with calomel, is most advantageous." Calomel, given so as to affect the constitution, has been found beneficial. Dr. Collins speaks very highly of tartar emetic with opium, in doses sufficient to produce nausea, but not vomiting. "In every severe case of convulsions, after having carried into effect the ordinary mode of treatment, as *bleeding freely*, *acting briskly* on the bowels with calomel and jalap, and at the same time adopting the means usually had recourse to for protecting the patient during a paroxysm, I endeavored to bring her under the influence of tartar emetic, so as to nauseate effectually, without vomiting. With this view, a tablespoonful of the following mixture was given every half-hour :—

Aquæ Pulegii, ℥viij.
Tartar Emetici, gr. viij.
Tinct. Opii. gtt. xxx.
Syr. Simpl. ʒij.
M.

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[1] Midwifery, p. 435.

[2] [Op. citat.]

"In some cases the quantity of tartar emetic used was only four grains to an eight-ounce mixture; and in others, the quantity of opium was somewhat increased."

It will be necessary to insert a wedge of leather or wood between the teeth, to prevent injury to the tongue, and also to remove everything out of the way, by striking against which the patient might hurt herself. [A roll of linen or muslin answers as well as leather, and is much better than wood; besides, it is always to be obtained at the moment when wanted.] This treatment applies equally to convulsions occurring before, during, or after labor—except that in the latter case venesection must depend on the state of the patient.

710. Very recently it has been proposed to administer anæsthetics, so as to produce insensibility, in hopes, at the same time, of calming the convulsions; and certainly so far as we can fairly judge from the cases on record, it appears a most valuable and successful remedy. Dr. W. Channing, of Boston, U. S., has used ether in ten cases; six mothers recovered and three children, a larger proportion than when ether was not used.[1] Mr. Turner, of Mansfield, administered chloroform in a case of convulsion after delivery, with perfect success. When given on the approach of a fit, it arrested it at once. The patient recovered.[2] Dr. Keith gave it in convulsions occurring during pregnancy. It quieted the fits, and when labor came on, the patient was placed completely under its influence, and kept so until delivery. She recovered well, and with no recurrence of the attacks.[3] In a case related by Mr. Morris it was equally beneficial.[4] In a case which occurred at Gosport, the inhalation was continued for three hours, after the patient had had thirty-three fits, and the success was complete.[5] Dr. Shekleton, the late master of the Dublin Lying-in Hospital, has tried it in nine cases; in five the convulsions were completely arrested, and in four they were lessened in intensity and frequency.[6] Mr. Bolton had recourse to it after bleeding and opium had failed, and with great success.[7] I have tried it in several cases with great benefit. Dr. Braun tried it in sixteen cases, all of which recovered completely.

711. The next important question is, *whether we are to interfere with the progress of gestation or parturition.*

I believe it is the general opinion, that, until labor sets in naturally, interference would be injurious; so that in convulsions during gestation, we have nothing to do with the uterus, but must confine ourselves to the treatment of the convulsive disease, and it is more especially useful if we have to deliver artificially.

If the attack take place at the commencement of the labor, some practitioners have been anxious to hasten the operations of nature by manual dilatation; but this has been abandoned, and very properly, as likely to increase the convulsions, without advancing the progress of delivery.[8] Belladonna has been applied to the cervix uteri, for the purpose of dilatation, but I should doubt its utility, and dread its poisonous effects.[9] The older writers, with some moderns, have proposed incision of the cervix, but the risk would outbalance any benefit to be derived from so "heroic" a remedy. But supposing the os uteri to be dilated or dilatable, are we then to proceed to deliver by art? This question has been much debated, and opposite opinions have been advocated. Some advise instant interference, and others no interference at all.[10] The true plan seems to be to avoid both extremes. We are not necessarily to interfere at this stage of the labor, beyond rupturing the membranes, which sometimes hastens the progress of the labor. Version, or turning, has been often recommended, but, from all the cases I have seen or collected, it would appear a most hazardous measure. Dr. Ramsbotham advises it, and yet the three cases he relates in which he practised it, proved fatal. Five patients out of seven are generally lost. Dr. Collins is strongly opposed to it. We may therefore conclude that version is not to be attempted, unless it should be proved that chloroform will secure the patient from a recurrence of the convulsions on the introduction of the hand.

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[1] On Etherization in Midwifery, pp. 307, 330.

[2] Lancet, Jan. 12th, 1850, p. 53.

[3] Ed. Monthly Journal, Aug. 1850.

[4] Ibid., May 1849, p. 767.

[5] Med. Times, March 23d, 1850, p. 229.

[6] Dublin Jour. of Med., Aug. 1852, p. 100.

[7] Lancet, Jan. 29th, 1852, p. 108.

[8] Denman's Introd. to Midwifery, p. 480.

[9] Blundell's Obstetricy, p. 950, note.

[10] Denman's Introduction, p. 425.

But when the head has descended into the pelvis, so as to be within reach of the forceps, and there is sufficient space, it will be proper to apply that instrument, inasmuch as delivery, when it can be accomplished, is essential. The attempt must be made during an interval between the paroxysms, and under chloroform, but should the introduction of the blades bring on a violent fit, it will be necessary to withdraw them, lest they should be forced through the vaginal or uterine parietes during the struggles of the patient.

Dr. Braun considers that craniotomy is never to be practised in convulsions without there be disproportion. In this I cannot agree with him. If the os uteri be dilatable, the pains feeble, and the convulsions very severe, we cannot hope that the mother will escape after many hours of such suffering, whereas we know that her best chance is delivery. We dare not turn, but we can craniotomize the child, and deliver, and if the child should be dead, it will be our duty to do so. Even if it be not, as forty-five per cent. are lost, it will be a question whether in neglecting to deliver for the sake of affording the child this bare chance of life, we do not thereby sacrifice the mother. In the worst case of convulsions I ever saw, to which I was called some time ago, I had no hesitation. The fits occurred with the first pains, were often repeated, the patient was comatose and insensible, the os uteri dilated to the size of a crown piece in twelve hours. I felt that the patient would probably die before the completion of labor naturally, and I therefore perforated and extracted the child (under chloroform), and the patient recovered, after an insensibility lasting nearly three days. Moreover, if the child be dead at any period of labor at which we may be called, craniotomy affords the most speedy means of delivery. And lastly, when the head is in the pelvis, if the space is too small for the forceps to be applied, as the child cannot be saved, we ought to have recourse to this operation, as soon as we are satisfied of the state of the case.

After the convulsions have ceased, Dr. Collins remarks: "Should the patient become maniacal, as is occasionally the result when the fits have been severe, and have continued for any length of time after delivery, all local distress, as pain in the head, or any symptom that would indicate abdominal complication, should be diligently looked after, and treated accordingly: as by so doing, keeping her fully under the influence of tartar emetic, at the same time acting well on the bowels, and excluding light from her room, as also all other external irritants, the best results may be expected. It is a great satisfaction to the friends of the patient in such a situation to be assured that there is little liability to a return of this derangement of mind, as is the case in most other forms of mania."

712. PROPHYLACTIC TREATMENT.—When we are consulted by a patient during pregnancy who presents any of the threatening symptoms before noticed, such as headache, giddiness, occasional blindness or double vision, and especially if these be combined with anasarca of the face and other extremities, and with albuminuria, there can be no doubt that active measures are required. Brisk purgatives, with venesection, or cupping the loins, if suitable and the patient can bear it, should be adopted, with small doses of tartar emetic or diaphoretics, moderate exercise, and a regulated diet.

All pressure should be removed. the lungs be allowed full play, and, if we believe. with Dr. Cormack. that the pressure of the gravid uterus upon the kidneys causes the albuminuria, then the patient should avoid the supine position as much as possible.

On the other hand. these symptoms may accompany an impoverished state of the blood, and the patient will require a good diet, with tonics. Cold or counter-irritation to the head may, at the same time, be necessary. Both Frerichs and Litzmann state that they have found benefit from benzoic and acetic acid. If the renal disease have existed for some time, our treatment must be less active: cold and counter-irritation, with gentle purgatives and acids. Diuretics are to be avoided. but counter-irritants to the loins, by means of mustard poultices, will be useful.

When convulsions occur before labor sets in. we are advised by Chailly, Pietra Santa, Sabatier, Braun. and Daniel, to bring on premature labor, and M. Bouchacourt, of Lyons, succeeded once in this way. MM. Legroux and Richelot doubt the propriety of this, and I agree with them; inasmuch as labor, when it comes on, is not necessarily accompanied by a recurrence of convulsions, especially if some time has elapsed since the attack.

713. 3. Apoplectic Convulsions.—This variety seldom or never occurs, except towards the termination or after the conclusion of labor. Dr. Burns,[1] indeed, mentions its occurrence at the commencement of labor, and MM. Morithon[2] and Menard[3] at the sixth month of pregnancy.

Causes.—It is evidently caused by the stress upon the cerebral vessels during the labor pains.

It is very probable that anxiety of mind may predispose to the attack; at least in one case I saw this appeared to be the case.

714. Symptoms.—In many cases the patient suffers from pain and throbbing in the head for some days previously; but in others there are no premonitory symptoms.

Generally speaking, during the labor the patient complains of headache; and during the second stage the face may be observed to be much flushed, and the eyes injected.

Strictly speaking, there is but little convulsion: the body and extremities are agitated or thrown about for a short time, and then the patient lies in a comatose state. There is little or no distortion of the face, and no frothing at the mouth. The muscles become flaccid and powerless; the respiration is stertorous; there is no return of intelligence, and rarely any repetition of the paroxysm, though such cases have been recorded. The pulse is full and slow, and the pupils in some cases dilated, in others contracted, but in all insensible to light.

In almost all cases the condition of the patient remains unaltered until death; but there are a few cases, answering, I presume, to the congestive apoplexy of Abercrombie and Lallemand, where our timely aid is successful, and the patient recovers sense and motion; and, if proper care be taken, is speedily well.

I do not know that I can give a better illustration of this disease than by relating the two following cases. For the first I was indebted to my friend, the late Dr. Aston; it appears to be a simple case of apoplexy from congestion: the second occurred in the practice of a dispensary to which I was attached. I quote them from a report I published some years ago in the Medical Gazette: "Catherine Costello, aged eighteen years and nine months, of low stature and corpulent figure, complained first of severe headache on Wednesday, January 2d, 1833. The pain was more violent than any of the kind she had ever experienced. Sickness of the stomach set in nearly at the same time, and she continued throwing up green bilious matter during the entire day; the bowels were confined for four days; the face and extremities were much swelled, which commenced two days before, and continued gradually to increase as the headache became more intense. She wanted about seven weeks to complete the usual term of utero-gestation. I [Dr. Aston] was sent for in the evening; she was walking about the room, but suffered most acutely; the face was swelled to such a degree as almost to hide the eyes, and her speech was somewhat thick. The motion of the child had not been felt all day. As she had an objection to bleeding, I omitted it for the present, and directed some opening medicine to relieve the bowels; and having given the requisite directions, I left her; but in a few hours her husband came for me in all haste, requesting my immediate attendance, as she had had a fit, and appeared to be in a dying state. Upon further inquiry, I was told that the pain in the head got much worse, when suddenly the eyes became fixed, the face distorted, convulsive motions ensued, and ended with stertor, which must have been of short continuance, as no such symptoms existed when I visited her a short time afterwards, *although she was unconscious of anything that happened until after venesection*, which I immediately performed to the extent of eighteen or nineteen ounces, from which she experienced almost instantaneous relief. The heat of skin was much greater than natural; thirst extremely urgent; pulse pretty frequent, but inclined to hardness; after venesection it became quicker; shortly after, slower and softer, until it gradually came down to the natural standard. From this time all the symptoms subsided, and she was delivered January 5th, and recovered well."

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[1] Midwifery, p. 527. [2] Trans. Méd., vol. v. p. 162. [3] Ibid., vol. iv. p. 241.

"Mary ——, æt. 30, was attended in her first confinement by a pupil of the Wellesley Dispensary, on Monday, November 20th, 1832. The labor was natural, and terminated within the usual period. She complained of severe headache during her labor, and seemed sleepy towards the conclusion. After asking some question of the attendants, she settled to sleep; some irregular motions of the limbs were noticed by those in the room, but nothing further, until her breathing became loud and heavy, when, as they could not rouse her, I was sent for. I found her perfectly insensible; pupils fixed and contracted; breathing stertorous; heat of head but little increased; abdomen distended with flatus; muscles perfectly flaccid; pulse firm, and tolerably full. The usual remedies were tried, but unsuccessfully, and she died during the night. A *post-mortem* examination was permitted, and we found great effusion of blood, filling both ventricles. A quantity of serum also was found at the base of the skull. On further inquiry, I learned that she had been the victim of seduction and desertion, and that she had suffered from depression of spirits and severe headaches for some weeks before her confinement."

715. PATHOLOGY.—The brain may be found greatly congested, but without any effusion; but this I believe to be rare.

There may be great effusion of serum, which by its pressure will cause symptoms of apoplexy.

More frequently, blood is poured out into the ventricles, into the substance of the brain, or at its base.

Cases of this kind have been noticed by Denman, Targioni, Marchais, Lachapelle, Leloutre, Schedel, Velpeau, etc.

716. DIAGNOSIS.—The entire and persistent insensibility, the absence of repeated paroxysms with their accompanying symptoms, will at once enable us to distinguish apoplectic from epileptic or hysteric convulsions.

It is not easy to distinguish that form which arises from congestion from that caused by effusion, the chief difference being in the intensity of the symptoms.

717. **Treatment.** — The most active antiphlogistic measures should be instantly put into requisition; a large quantity of blood should be taken from the arm, jugular vein, or temporal artery, and repeated if necessary. This is the more requisite, as it is from the effect of bloodletting that we are mainly to look for the distinction between apoplexy from congestion, and apoplexy from effusion. If no relief whatever be afforded, the case may be regarded as nearly hopeless; but if the patient be at all benefited, the head should then be shaved, and ice applied.

After a short time a large blister may be applied to the head or neck, and a brisk purgative given.

These remedies will generally afford relief in those cases which are susceptible of it, and they may be modified or repeated as circumstances may require.

Should this variety occur during labor, and the uterine action be suspended, it will be desirable to deliver the patient as speedily as possible, so as to save the child; and for this purpose, if the head be within reach, the long or short forceps should be applied.

CHAPTER XXII.

PARTURITION.—CLASS III. COMPLEX LABOR.

ORDER 5. LACERATIONS.

718. Under this head I propose to treat of rupture of the uterus and vagina, vesico-vaginal and recto-vaginal fistula, and laceration of the perineum.

1. **Rupture of the uterus.** — This formidable and very fatal accident has long been known to practitioners in midwifery.[1]

It is not, however, confined to the time of parturition but, may occur during gestation, or at a more advanced period of life.

719. **Statistics.** — The following table will indicate the frequency of its occurrence.

Authors.	Total No. of Cases.	Cases of Rupture.
Dr. Jos. Clarke	10,387	8
Dr. Merriman	2,947	1
Dr. M'Keever	8,600	20
Dr. Collins	16,654	34
M. Pacaud	4,180	2
Dr. F. H. Ramsbotham	68,435	13
Dr. Toogood	1,135	4
Mr. K. Watson	800	8
Drs. M'Clintock and Hardy	6,634	9
Drs. Johnston and Sinclair	13,748	17

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[1] I would recommend to the attentive perusal of the reader, a most valuable monograph on this subject by Dr. J. D. Trask, Amer. Journ. of Med. Sciences, Jan. and April, 1848.

Making a total of 111 cases in 133,520 patients, or about 1 in 1203.
Dr. Burns says that it occurs about once in 940 cases.
It rarely occurs with first children.

Of Dr. Jos. Clarke's cases —
1 was the 2d pregnancy.
1 " 3rd "
2 " 4th "
1 " 7th "
1 " 8th "
1 " 9th "
Of Dr. M'Keever's cases —
4 had 2 children.
5 " 3 "
4 " 6 "
2 " 7 "
2 " 8 "
1 " 9 "
Of Dr. Ramsbotham's cases —
2 were 2d pregnancies.
1 " 4th "
3 " 7th "
Of Dr. Collins' 34 cases —
7 were 1st pregnancies.
6 " 2nd "

Of Dr. Collin's 34 cases —
6 were 3d pregnancies.
2 " 4th "
2 " 5th "
5 " 6th "
1 " 8th "
1 " 9th "
2 " 10th "
2 " 11th "

Dr. Cathrall's case was a 1st pregnancy.[1]

Dr. Simms' patient had had several children.[2]

Dr. Hooper's case was the 4th pregnancy.[3]
Mr. Kite's,[4] " " 2d "
Dr. Frizells,[5] " " 7th "
Mr. Powell's,[6] " " 1st "

Mr. Birch's cases were the 3d and 4th pregnancies.[7]

Mr. Partridge's case was the 7th pregnancy.[8]

Thus, of 75 cases, 9 occurred in the first pregnancy; 14 in the 2d; 13 in the 3d; and 37 in the 4th or subsequent pregnancies.

In Dr. Trask's collection 24 cases occurred in the 1st pregnancy; 18 in the 2d; 17 in the 3d; 21 in the 4th; 18 in the 5th; 16 in the 6th; 9 in the 7th; 5 in the 8th; 5 in the 9th; 9 in the 10th; 8 in the 11th; 3 in the 12th; 2 in the 13th; and several in the 17th.

720. CAUSES.—Various causes may give rise to it, and it may happen at different periods —.

1. *During gestation.* — That form of extra-uterine pregnancy which is called *interstitial fœtation* may give rise to it. The ovum, instead of passing direct from the fallopian tube into the uterine cavity, is retained in an interstice of the uterine fibres, where it grows up to a certain point. As it increases, the outer portion of the uterine parietes becomes gradually thinner by absorption (as in the case of abscess), and at length gives way, and the fœtus is precipitated into the abdomen, converting the case into one of ventral fœtation;[9] it may also be the consequence of disease, as in Mr. Else's and Dr. Spark's[10] cases; from softening, and from abscess in the walls, as related by Duparcque.[11] Any violent accident, such as a fall or a blow, or great fatigue, may give rise to it. It sometimes occurs without any assignable cause; the patient, perhaps, is awakened from sleep by it, as in the cases related by Mr. Scott of Bromley,[12] and Mr. Glen of Brompton.[13] It has been attributed to irregular action of the uterine fibres.

721. 2. *During labor.*—*a.* If the uterus have been attacked by inflammation during pregnancy, its tissue may have been so much weakened or disorganized, that the violent contractions which take place during labor may rupture it, from the want of consentaneous action in the part affected, or from the pressure of some part of the child against it. Steidele relates a

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[1] Med Facts and Obs., vol. viii. p. 146.

[2] Ibid., p. 150.

[3] Mem. of Med. Society, vol. ii. p. 118.

[4] Ibid., vol. iv. p. 253.

[5] Trans. of Association, vol. ii. p. 15.

[6] Med.-Chir. Trans., vol. xii. p. 587.

[7] Ibid., vol. xiii. p. 357.

[8] Ibid., vol. xix. p. 72.

[9] Med. Gazette, vol. ii. p. 400.

[10] Ibid., vol. ii. p. 218.

[11] Ruptures de l'Utérus, pp. 15, 16.

[12] Med. Repository, vol. vii.

[13] Merriman's Synopsis — Appendix.

case where rupture occurred in consequence of gangrene.[1] My friend, Dr. Murphy,[2] has published an excellent paper illustrative of this cause of rupture, with cases where the uterus was atrophied, thinned, or softened in texture. Duparcque quotes cases of thinning of the uterine walls, softening, scirrhus, and gangrene. Dr. Trask states that of 49 cases in his collection, where the condition of the uterus was given, in 10 it was healthy; in 14 it was thinned; in 14 softened; in 1 both thinned and softened; in 2 both softened and thickened; in 1 thickened; in 3 diseased. In some cases the seat of the laceration corresponds exactly with the situation of the previous pain. Dr. Tyler Smith believes that in many cases violent uterine action is in itself the cause of rupture; the immediate cause being either emotion or volition, or a reflex or peristaltic action.

The period of labor at which the rupture may occur from this cause will vary; it may be at the beginning, before the rupture of the membranes; during the passage of the head through the pelvis, or after the delivery.

b. A certain amount of narrowing of the upper outlet may give rise to it. This is a purely mechanical cause. The head of the child is forced downwards by violent labor pains, but is unable to enter the pelvis, from the contraction of the upper strait; now if the pains continue with great power, the head is turned to one side or the other, or posteriorly; and the only obstacle here being the uterine or vaginal parietes, the head is driven through them at the weakest part. They offer the less resistance, probably, from the woman having generally borne several children. In one of Dr. Clark's cases, the antero-posterior diameter of the upper outlet measured but 3 inches; in two others, 3½. In case 18 of Dr. Douglas, the pelvis measured but two inches antero-posteriorly; and in another case (20) there was a bony ridge on the top of the symphysis pubis, to which the rent corresponded. In one of Dr. Ramsbotham's cases the antero-posterior diameter was only 2 inches; in another 3 inches; and a third had always had difficult labors previously. In one of Dr. Collins' cases, the same diameter measured 2½ inches; and in several it appeared narrower than usual. Dr. F. Ramsbotham has never known a case in which there was not some contraction.[3] Dr. Roberton collected 37 cases from various sources, in which there was diminution of the pelvic diameters.[4]

Various explanations have been given of the *modus operandi* of this contraction, Dewees attributing the rupture to inflammation and gangrene, Denman to the effect of pressure and attrition, Dr. Burns to pressure of the cervix between the head and the pelvis, and Dr. Ramsbotham to thinning from pressure and inflammation. However this cause may act, it doubtless gives rise more frequently to rupture of the cervix than of any other part. I quite agree with the opinion of Drs. M'Clintock and Hardy, that the effect is more likely to be produced when the amount is slight than when it is excessive.

The sex of the child will contribute to the increase of this disproportion —male children having the larger heads. Now, of the 20 cases mentioned by Dr. M'Keever, 15 children were males, and 5 females; and of Dr. Collins' 34 cases, 23 were males. This result of an unusual size of the child's head is still more remarkable when the head is dropsical, as in the cases related by Campbell, Collins, Lord, Ramsbotham, Chance, etc.[5]

It occurs at all ages; but the proportional frequency is greater above 30 years of age than previously.

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[1] Diss. de Rup. in Partu, dolor. Utero.

[2] Dublin Journal of Med. vol. vii. p. 198.

[3] Obstetric Med. and Surgery.

[4] Phys. and Diseases of Women, and on Midwifery, p. 292.

[5] Trask's Essay, Amer. Journ. of Med., Jan., 1848.

Dr. Collins found	Dr. Collins found
1 patient of the age of 16 years.	7 patients of the age of 30 years.
1 " " " 21 "	2 " " " 32 "
1 " " " 24 "	1 " " " 33 "
3 " " " 25 "	1 " " " 34 "
2 " " " 26 "	3 " " " 35 "
1 " " " 27 "	5 " " " 36 "
3 " " " 28 "	1 " " " 37 "
1 " " " 29 "	1 " " " 40 "

c. The oblique position of the uterus, or of the child's head at the brim, has been assigned as a cause, from its directing the force of the child's head against the side of the cervix uteri and vagina.

d. Some one of the tissues of the uterus may give way previous to or during labor; perhaps from previous disease; perhaps from some peculiarity of structure; and in some cases, without any appreciable cause. Sir Charles M. Clarke published a case, in which the peritoneal covering of the uterus alone was torn; and similar cases have been since recorded by Mr. Partridge, Mr. White, Dr. Ramsbotham, Mr. Chatto, and Dr. Davis. Dr. Collins has also met with a case of this kind, and others are on record. Dr. Radford published two cases in which the muscular coat was torn, the serous membrane remaining uninjured. Dr. Ramsbotham met with a case nearly similar; and Dr. Collins met with nine such cases. Duparcque relates one, and Velpeau two. Many years ago, I assisted at the *post-mortem* examination of a patient who was attacked with symptoms of ruptured uterus, sudden pain in the abdomen, vomiting, collapse, etc.; and who died in a few hours. We found no rupture in any part, but extensive effusion of blood beneath the peritoneum, covering the uterus, and lining the iliac fossæ; the result, probably, of a ruptured bloodvessel. There were also twelve or fourteen ounces of sero-sanguineous fluid in the peritoneal cavity. Though the extent of mischief is less in these cases, yet they are equally fatal.

e. Violence in turning the child may rupture the uterus, and it may accompany this operation, in certain states of the cervix, without any fault of the operator.

f. Rigidity of the os uteri, or imperforation, may occasion laceration.[1] There are several cases on record where the cervix uteri has been torn completely off during labor. Steidele, Mr. Scott of Norwich, Dr. E. Kennedy, Dr. Power, and Dr. Lever, have each recorded such cases, and I have seen one myself. It appears to be the result of pressure at the brim of the pelvis, rendering the texture of the cervix soft and easily torn.[2]

g. Occlusion, partial or complete, of the vagina has in many cases occasioned rupture of the cervix and body of the uterus, as I have shown elsewhere.[3]

h. It may be caused or aided by the peculiar presentation; but this cannot be very often the case, as, out of 303 cases collected by Dr. Trask, there were only 16 presentations of the shoulder, arm, or side, and two of the breech; the remainder were head presentations.

The duration of the labor has been supposed to influence the occurrence of rupture; but Dr. Trask has shown that this is not the case. In 89 cases, 48 were not more than 12 hours in labor; and the average duration of the whole was rather more than 21 hours. In 38 cases the pains were moderate, in 63 they were severe; and in the majority of Dr. Roberton's cases the labor was under 13 hours.

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[1] Ante, p. 268, on Rigidity of Cervix Uteri.

[2] Diseases of Women. Chapter on Occlusion of Os Uteri.

[3] Ibid., Occlusion of Vagina.

Among the *direct causes* are enumerated blows, falls, anger, convulsions, excessive movements of the child, over-distension, etc. In one case, M. Malgaigne attributed it to the mal-administration of ergot of rye. Dr. Trask gives four such cases.

722. 3. *At an advanced period of life.* — The structure of the cervix uteri is much changed in old age; it becomes close and dense, resembling cartilage, and the canal through it is always reduced in size, and sometimes obliterated. When the outlet for the escape of the uterine mucus is thus closed, it accumulates; and if the quantity be sufficient to distend the cavity, a process of thinning or absorption commences in some part of the walls of the uterus, and proceeds until an opening is made into the peritoneal sac. The same process will take place with any other fluid thus deprived of exit. Duparcque quotes two cases of the kind. In some few cases a similar process has occurred during middle life, as in the case related by Dr. Gozzo of Naples, whose patient was only æt. 38.[1]

723. PATHOLOGY. — If the laceration be the result of disease, it may take place at any part of the organ, the body, fundus, or cervix; and it will generally be found to correspond to the situation of the pain felt by the patient previously. The edges of the rent exhibit marks of disease, the tissue is thinned, softened and pulpy, breaking down easily under the finger. The color may be changed to a deep red or brown color, and occasionally the odor is offensive.

When the laceration is the result of mechanical causes, it generally takes place near the cervix, and involves both the uterus and vagina. It may run along the anterior or posterior surface of the uterus, or at one side. In 6 of Dr. Jos. Clarke's cases, it was on the anterior surface, and in 1 posteriorly. In Dr. Simms' and Hooper's cases, it was anteriorly; in Mr. Birch's, posteriorly; and in Mr. Cathrall's case, on the right side. In 3 of Dr. Ramsbotham's cases, it was posteriorly; in 1, along the right side; and in another, along the left. Of 23 cases, Dr. Collins found 1 on the right, and 1 on the left side — 11 posteriorly, and 10 anteriorly. In Dr. Trask's extensive collection of cases, we find that of those which occurred during gestation, in 7 the laceration was of the fundus, in 1 of the posterior part, in 2 of the anterior part, in 2 of the right side, in 1 of the left side, in 3 of the cervix and vagina, in 1 from cervix to fundus, in 1 of cervix, body, and bladder, in 2 of the posterior and inferior parts, in 1 the lower segment of the womb was torn off. Of those which occurred during parturition, 11 were of the fundus, 13 of the posterior part, 14 of the anterior part, 8 of the right side, 7 of the left side, 2 of the vagina, 15 from cervix to fundus, 2 involving the bladder, 47 at the cervix and involving the vagina and separation from the vagina, 2 of the body, 7 transverse. Thus, of the total occurring during gestation, 13 were of the fundus and body, and 8 of the cervix: of the total occurring during parturition, 63 were of the body and fundus, and 64 of the cervix, involving, more or less, the body of the uterus and the vagina.[2] In one of Dr. Roberton's cases, the cervix was separated from the vagina, except a shred, in 8 the laceration was anterior, in 11 posterior, in 5 lateral, in 3 antero-lateral, and in 3 postero-lateral.[3]

The direction of the rent may be nearly perpendicular, or inclining to one or other side, or running transversely. In these cases the structure of the uterus is scarcely altered; its texture is firm, and its color natural, except where blood is ecchymosed. The edges of the rent are jagged and uneven. Occasionally, but very rarely, the bladder has also been torn.[4]

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[1] Brit. and For. Med.-Chir. Review, Oct. 1848.

[2] American Journal of Med. Science, April, 1848, p. 393.

[3] Phys. and Dis. of Women and Midwifery, p. 312.

[4] Archives Gén. de Méd., vol. xviii. p. 109. Laennec Picquet, Thèse, Paris, 1822.

When the serous membrane alone is injured, we find numerous small incisions, resembling scarifications, from a quarter to half an inch in length, and one or two lines in depth, or a smaller number of larger lacerations. They are almost always curved, with the convex part towards the fundus, and may be situated on the anterior or posterior wall of the organ. In all the cases hitherto mentioned, more or less blood is found effused in the peritoneal sac, and in many, the usual products of peritonitis.

When the muscular structure alone is injured, it may present either a simple solution of continuity, or evidences of disease. Blood may be found in the cavity of the uterus, and the serous membrane may be inflamed, with the usual results.

The cervix uteri, when separated, has generally a bruised appearance, is swollen, and of a red color. The edges are ragged and uneven. The canal of the vagina is rendered continuous with that of the uterus, but the connection between them is not compromised.

When the uterus of an old person is ruptured, from the cause assigned, we shall discover a perforation in some part of it, with a considerable thinning of the walls around it.

In all these cases, with the exception of those in which the os uteri is torn off, or the muscular structure alone injured, we find marks of extensive peritonitis, unless the patient die of the shock.

754. SYMPTOMS. — These vary very slightly, whether the uterus be torn completely through, or whether the peritonal or muscular tissues alone be injured, or whether the vagina be alone damaged.

Certain authors have pointed out what they deem premonitory symptoms; but these are exceedingly ambiguous. The circumstances which may justly excite our fears are, previous difficult labors, the occurrence of partial hysteritis during gestation; and during labor, the coincidence of violent labor pains with a narrow pelvis.

Rupture of the uterus and vagina is marked by a sudden, acute, and intolerable pain, like a cramp; a sense of some part bursting, giving way, or tearing, with an audible noise, according to the testimony of some patients; the suspension of the labor pains; recession of the head generally; hemorrhage from the vagina; and a rapidly succeeding state of collapse. Of these symptoms, the excruciating pain and the collapse are the most constant; as in some cases the bursting or tearing is not felt; and when only one tissue suffers, the labor may continue, and there may be no hemorrhage. The pain continues, with little or no intermission. The stomach is disturbed, and vomiting ensues, at first of the contents of the stomach, then of a greenish, and ultimately of a black matter — the "coffee-ground vomit." The countenance is pale and ghastly, with an expression of intense suffering and anxiety; the surface is cold and clammy. The pulse is very rapid, small, feeble, and fluttering, the respiration hurried and difficult; and the patient requires to be raised in bed. There is almost always a discharge of blood from the vagina; sometimes slight, and at others so considerable as to cause death.

We know, also, from *post-mortem* examination, that in most cases, hemorrhage takes place into the abdominal cavity; and some authors have attributed the state of collapse to this cause; but though it may aggravate the collapse, we know that this is present when there is no internal hemorrhage. When the rupture is complete, the expulsive efforts cease, because the child escapes, partially or wholly, from the cavity of the uterus into the abdominal cavity, where it may be felt by the hand through the abdominal parietes. The presentation, which was probably within reach before the accident, cannot now be ascertained by the finger.

When the rupture is complete, a loop of intestine may escape through it, and give rise to the symptoms of strangulated hernia. Duparcque quotes three cases of this kind from Remigius, Percy, and Beauregard. Dr. Trask collected sixteen cases in which this occurred. A case is related by Dr. M'Keever, where a yard and a half of intestine became strangulated, and sloughed off.

The state of collapse may continue for some time, if it do not prove immediately fatal; but at length a certain amount of reaction takes place; inflammation sets in, and the patient exhibits all the symptoms of peritonitis —acute pain, exquisite tenderness of the abdomen on pressure, tympanites, decubitus on the back, with the knees drawn up, quick, small, hard pulse, hurried respiration, etc., etc.

When the vagina alone is seriously ruptured, the sudden pain is absent, but the collapse is more or less complete, and although the regular labor pains become feeble or cease, the uterine action is not paralyzed, as in rupture of the uterine substance; but if we aid in the delivery we shall find the uterus assist in expelling the child and placenta. There will, of course, be no recession, but there will be hemorrhage, external or internal. In a case which came under my observation, the collapse was not complete, but sufficient to indicate some grievous organic injury; the patient was then delivered by the forceps, during which operation the uterus acted firmly, and afterwards expelled the placenta without assistance. The external hemorrhage was very moderate, but the collapse, pallor, quick weak pulse, continued for four or five days, and then suddenly increased, and ended in death. On examination *post-mortem*, we found that the vagina had been ruptured at its junction with the uterus, that a large sac filled with blood had thus been formed, covered at its upper part only by peritoneum, and that this covering had given way, probably at the time when the collapse became complete, and that a large quantity of blood had then been effused into the peritoneum, but that inflammation had not set in, evidently for want of time. M. Danyau has published[1] a case of rupture of the vagina only, which he saw, and which was characterized by cessation of pains, recession of the head, abdominal tenderness, collapse, etc., but the child had escaped into the abdomen through the rent. He refers to seventeen cases of this kind, four of which, those of Ross, Douglas, Smith, and his own, recovered. In none was gastrotomy performed.

725. TERMINATIONS.—The patient may die of the shock a few minutes or hours after the accident, or after delivery; or she may survive the shock, and die of the peritonitis; or, lastly, she may be carried off by secondary diseases, as sub-peritoneal, or lumbar abscess, etc.[2]

Of Dr. Jos. Clarke's patients—
1 died undelivered.
1 " in 4 hours.
1 " 20 "
2 " 24 "
1 " 30 "
Of Dr. Ramsbotham's—
3 died shortly after delivery.
2 in 1 hour "
1 " 3 days "
Of Dr. Collins' cases—
4 women died immediately after delivery.
1 " in 2 hours "
3 " 4 " "
1 " 10 " "

Of Dr. Collins' cases—
2 women died in 14 hours after delivery.
1 " 17 " "
1 " 24 " "
1 " 25 " "
1 " 30 " "
4 " on the 2d day "
1 " 3d " "
4 " 4th " "
1 " 5th " "
2 " 8th " "
1 " 9th " "
1 " 11th " "
1 " 14th " "
1 " 24th " "

In a case under my care, the patient died in five minutes undelivered.

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[1] Brit. and Foreign Med. Review, April, 1852, from Mém de la Soc. de Chirurg., vol. ii.

[2] Burns' Midwifery, pp. 528, 531. Denman's Introduction, p. 261.

In by far the greater number of cases, the accident proves fatal.

Of Dr. Smellie's	3 cases,	2 died.	Of Dr. Collins'	34 cases,	32 died.
Dr. Jos. Clarke's	8 "	7 "	Dr. Beatty's	1 "	1 "
Dr. Merriman's	1 "	1 "	Drs. M'Clintock and Hardy's	9 "	9 "
Dr. M'Keever's	11 "	9 "			
Dr. Ramsbotham's	13 "	10 "			

726. Some cases, however, are on record where the patient recovered. Heister relates a case mentioned to him by Rungius; and Spiering, one cured by Forquosa. M. Peu,[1] Dr. Hamilton,[2] Dr. James Hamilton,[3] Dr. Jos. Clarke,[4] Dr. Douglas,[5] Dr. Labatt,[6] Dr. Frizell,[7] Mr. Ross,[8] Mr. Kite,[9] Mr. Powell,[10] Mr. Birch,[11] Mr. Smith,[12] Mr. MacIntyre,[13] Dr. Hendrie,[14] Mr. Brook,[15] Dr. Davis,[16] Mr. Church,[17] M. Stobo,[18] have each recorded one case of cure. Dr. M'Keever and Dr. Collins have each related two, and Dr. Ramsbotham three cases. Duparcque has collected four from French authorities. Osiander states that he has known several cases of recovery. Velpeau quotes several cases.

There are a very few instances on record where the patient has recovered, although the fœtus remained in the peritoneal cavity.

In cases of interstitial fœtation, also, the patient has sometimes survived both shock and inflammation.

727. DIAGNOSIS. — The sudden acute pain, the cessation of labor, the collapse, and the recession of the child, will render it easy to recognize the case.

But when the rupture is partial, it may be more difficult, and we must rely mainly upon the sudden pain and the collapse for our diagnosis. The occurrence of peritonitis subsequently, will serve to clear up the difficulty.

In a very able paper in the Dublin Journal, Dr. McClintock has shown that the life or death of the child is a most valuable diagnostic sign. In cases of laceration the child dies almost immediately.

The sudden occurrence of Peritonitis in old women may excite a suspicion of its origin, but it will not be easy to arrive at certainty.

PROGNOSIS.—From the details already given, it is almost unnecessary to state that the prognosis is always grave. So very few are saved that there is but a faint hope of the recovery of the patient.

728. TREATMENT.—The first question which presents itself, when a rupture of the uterus is recognized, is, "*shall the patient be delivered at once, or left to nature?*" When the os uteri is undilated instant delivery may be impossible: but in all cases where it is possible, the testimony of experience is in favor of immediate delivery.

Dr. W. Hunter and Dr. Garthshore advised that the case should be left to nature; and subsequent to the publication of his Introduction to Midwifery, Dr. Denman came to the same conclusion. The evidence of facts, however, must be allowed to counterbalance even such illustrious names; and that evidence is unquestionably in favor of delivery.

Dr. Trask's researches confirm the propriety of immediate delivery; for of those who recovered, the average time that elapsed between the occurrence of rupture and delivery was under five hours, whilst in those that died it was over five hours. Of Dr. Trask's cases. 154 were delivered by artificial means, 97 died, 57 survived; of 89 abandoned undelivered, 65 died, 24 survived; of 31 delivered by natural efforts, 20 died, and 11 survived; of 6 in whom artificial delivery was tried and failed, all died undelivered. Thus, a comparison of those delivered by art with those abandoned undelivered, gives 37 of the former saved to 27 of the latter in the hundred. But this is not all, for we find that the average continuance of life after rupture in those delivered is twenty-two hours, and in those undelivered, only nine hours.

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[1] Pratique des Accouchmens, p. 341.

[2] Outlines of Midwifery.

[3] Select Cases in Midwifery, p. 138.

[4] Trans. of Association, vol. i.

[5] Essay on Rupture of the Uterus, p. 7.

[6] Dublin Med. Essays, p. 343.

[7] Trans. of Association, vol. ii. p. 15.

[8] Annals of Medicine, vol. iii. p. 377.

[9] Mem. of Med. Soc., vol. iv. p. 253.

[10] Med.-Chir. Trans., vol. xii. p. 537.

[11] Ibid., vol. xiii. p. 357.

[12] Ibid., vol. xiii. p. 378.

[13] Med. Gazette, vol. vii. p. 9.

[14] Amer. Journ. of Med. Science, vol. vi. p. 351.

[15] Med. Gazette, Jan. 17, 1829.

[16] Obstetric Medicine, vol. ii. p. 1070.

[17] Lancet, May 19th, 1849.

[18] Med. Times, April 6th, 1850.

729. The *mode* of delivery will depend altogether upon the circumstances of the case.

1. If the head have not receded, and be within reach, or be already in the pelvis, it will be well to deliver with the forceps, if possible; but if not, we must have recourse to the perforator, and with the less hesitation, as Drs. M'Clintock and Hardy have shown that the death of the fœtus almost instantly follows the occurrence of rupture.

2. If the child have escaped into the cavity of the abdomen, or if the brim of the pelvis be much contracted, the hand must be introduced into the vagina, and, if practicable, passed through the laceration, and the feet seized and brought down, so that the child may be extracted through the rent. Care must be taken to avoid dragging down or injuring the intestine, in case it should have prolapsed. The placenta is then to be removed, the vagina cleansed, etc. In all these cases the child is born dead.

3. If the uterus have contracted very firmly, it may be impossible to pass the hand through the rent; or the pelvis may be too narrow to admit of the child being extracted footling, or even of the passage of the hand. In such cases we are advised to perform the Cæsarian section, and extract the child and secundines through the abdominal parietes. Successful cases are related by Thibault des Bois, Lassus, Haden, Baudelocque, Latouche and Jopel, Lambron, Glodat, etc. To these may be added cases related by the following:—MM. Coquin,[1] Sommer,[2] Ceconi,[3] Ruth,[4] Rust.[5] Gais, Naegelè, Weinhardt,[6] Heim,[7] Busch, Demay,[8] Lechaptois et Lair,[9] Velpeau.[10]

4. This will be the only mode of delivery, in ruptures occurring during gestation, before labor has commenced.

"In regard to the point of duty in the management of such cases (of ruptured uterus), I have to remark," says Dr. Meigs,[11] "that, upon discovering even the smallest commencement of a laceration of the vagina or cervix uteri, the earliest practicable precautions should be taken to ensure delivery *per vias naturales*, and the prevention of the escape of the child into the peritoneal sac. This should be done, where it is practicable and convenient, by seizing the head, if it be the head, in the grasp of the obstetrical forceps; by bringing down the feet, if it be a breech; by turning and delivering, if it be a shoulder case; or by turning to deliver, if it be a case of face presentation, or departure of the chin, or any condition indeed in which the operation of version would be most likely to rescue the woman from the dangers by which she is surrounded.

"Should the laceration have permitted the child to escape at once into the peritoneal sac, let the attendant lose no time, but bare his arm, and resolutely, with his hand passed through the rent, explore the abdomen in search of the feet, which he should immediately withdraw through the opening of laceration. But if this be not done; if some hours should have elapsed subsequent to the occurrence of the accident; if the woman be already much exhausted by hemorrhage. by constitutional shock and irritation, the question will arise as to the properest manner of fulfilling the indication, which must ever be to extract the child. The hemorrhage will now have been stayed: were it not so, the woman would be already dead: to pass the hand through the rent, should it be in the vagina, would be to set the hemorrhage again on foot. It will be always impossible to pass the hand through the rent in the uterus, because the uterus, being now contracted, will have reduced the size of the rent in proportion to the condensation of the organ. The child can never be returned through a contracted rent, having passed through it while the uterus was yet undiminished in size. I say, then, the question arises as to the mode in which the indication is to be carried out.

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[1] Bulletin de la Faculté, 1812, p. 86.

[2] Ibid.

[3] Bulletin de Ferussac, vol. v. p. 47.

[4] Ibid., vol. vi. p. 280.

[5] Luroth, Ibid, vol. xix., p 85.

[6] Ibid.

[7] Ibid.

[8] Journal Gén., vol. v. p. 58.

[9] Ibid., vol. i. p. 187.

[10] Traité d'Accouch., p. 355.

[11] [Op. cit.]

"I am firmly convinced, that, should I be called this day to the conduct of such a case, I should feel bound by my conscience to recommend a delivery by a gastrotomy operation. I cannot think that a clean incised wound along the linea alba, sufficient in length to permit the extraction of the child from the peretoneal sac, however exceptionable in itself merely considered, can be held in the least degree objectionable, when compared with the delay, the fatigue, the contusion and the renewal of the suspended hemorrhage, that would inevitably attend an attempt to extract *per vias naturales.*"

730. During the stage of collapse, it may be necessary to give stimulants, ammonia, camphor, musk, wine, etc.; but this should be done with great judgment, so as just to attain our object, and no more; bearing in mind that whilst we may be relieving the collapse, we may be aggravating the reaction, and increasing the danger at that period. A large dose of opium may be given after the delivery.

When inflammation sets in, of course the treatment must be actively antiphlogistic. Three or four dozen leeches should be applied over the abdomen, and repeated, if necessary. Large bran poultices are useful, and hip-baths are recommended. Calomel and opium, or opium alone, is the most valuable remedy we possess. It should be given in large doses, or in smaller ones more frequently, so as to influence the system rapidly.

If the rupture have arisen from narrowness of the upper outlet of the pelvis, and the patient recover, and again become pregnant, premature labor should be induced, at such a period of gestation as will allow the fœtus to pass without difficulty. It is of course desirable that the operation should, if possible, be deferred until the fœtus is "viable;" but I do not think this a *sine quâ non*, when the child cannot be saved we ought to save the mother. Dr. Collins relates a successful case of this kind, in which the patient was delivered the first time after the rupture by artificial premature labor, and afterwards naturally. In Dr. Douglas' case, the patient was delivered by turning, the first pregnancy after the accident, and naturally the second. It would, however, be much wiser for the patient to avoid the risk of a subsequent delivery.

731. II. VESICO-VAGINAL FISTULA.—Perforation of the coats of the vagina, anteriorly or posteriorly, with the subjacent organs, the bladder or rectum, is not very rare, and is one of the most distressing and intolerable accidents to which females are subject; and the more so, as a cure is but seldom effected. Indeed, vesico-vaginal fistula has long been considered as one of the *opprobria* of surgery; and, until recently, of late years the cure has been given up as hopeless.

Vesico-vaginal fistulæ are more frequent than perforations of the rectum; they are generally found separately, but in some cases co-exist. A case was received into the Meath Hospital some years ago, in which the bladder and rectum were both perforated, the perineum lacerated, the canal of the vagina distorted by cicatrices, and closed at its upper part by adhesions.

Strictly speaking, we can hardly consider this form of laceration a complication of labor, it is rather one of its sequelæ, except in those unfortunate cases where injury is inflicted during extraction of the child, or the urine is allowed so to accumulate as to expose the bladder to rupture from the pressure of the child's head.

732. Causes.—Various *causes* may give rise to this accident:

1. Either wall of the vagina may be wounded, accidentally, or on purpose, by cutting instruments. Such has been the result of criminal attempts to procure abortion. In these cases, however, a cure often takes place spontaneously.

2. The long retention of a pessary in the vagina may give rise to inflammation and ulceration of the vaginal tunics, and ultimately to perforation of the bladder or rectum. This, however, but seldom occurs, and then only in aged females, for whom little can be done in the way of cure.[1]

3. In powerless or difficult labors, where the head of the child is long retained in the pelvis, or where, by its size, it makes great pressure, the vagina may be the seat of inflammation, ulceration, and perforation, involving either of the subjacent organs, but much more frequently the bladder. In these cases, the vagina is frequently narrowed, or deformed by irregular, circular, or spiral cicatrices, rendering the detection of the fistula somewhat difficult.

4. A maladroit use of instruments may occasion this injury. Cases of both kinds of fistula could easily be adduced from authors, as the result of carelessness or incompetence in the operator.

5. Retention of urine during labor will generally involve more or less pressure upon the bladder; if within certain limits, perforation will be the result of subsequent inflammation; if the distension be excessive, and the bladder protrude into the pelvis, so as to be pushed before it by the descending head of the infant, then, most probably, rupture of the bladder and vagina will take place.

6. The bladder is occasionally lacerated in rupture of the uterus, though there may not necessarily be a perforation of the vagina.[2]

7. In corroding ulcer and cancer of the uterus, the ulceration may involve either or both walls of the uterus, and perforate the bladder, or rectum, or both. For these cases, however, nothing curative can be attempted.

8. A pelvic abscess may open into the bladder, uterus, or rectum, or into more than one of these cavities, and the opening may remain fistulous, as in the cases published by Dr. Simpson.[3]

733. The *situation* of the perforation is of great importance in the cure of vesico-vaginal fistulæ. It may be at the junction of the urethra with the bladder — in the neck of the bladder — or in some part of its body. The opening may be more or less circular in form, or it may be a rent running longitudinally from before backwards, or transversely. The curability of the fistula will depend, in a great degree, upon the amount of the loss of substance.

734. Symptoms. — These depend primarily upon the cause of the fistula, and will vary according to it; and *secondarily*, upon the escape of the contents of the wounded organ. Whichever organ be wounded, the result is inexpressible distress to the patient. The escape of urine is attended with so marked and irrepressible an odor, that the patient is placed "*hors de société*." Obliged to confine herself to her own room, she finds herself an

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[1] Cooper's Surgical Dict., p. 1090.

[2] Blundell, Dis. of Women, p. 69.

[3] Ed. Monthly Journal, Dec. 1852. Obstetric Works, p. 232.

object of disgust to her dearest friends, and even to her attendants. She lives the life of a recluse, without the comforts of it, or even the consolation of its being voluntary. It is scarcely possible to conceive an object more loudly calling for our pity, and strenuous exertions to mitigate, if not remove, the evils of her melancholy condition. In addition to the offensive smell, the escape of the urine gives rise to excoriation of the vagina, external parts, and thighs. The flow of urine is constant when the neck of the bladder is the seat of the injury, and at intervals when the wound is small and situated more posteriorly.

In all cases a careful examination should be made, by passing a catheter into the bladder, and a finger into the vagina; then placing the points of both in apposition, the whole posterior surface of the bladder should be passed over, and carefully examined. At some one point the finger and catheter will come in contact; the catheter may then be passed into the vagina, and the extent of the damage ascertained. In many cases the speculum will afford us an accurate view of the opening, and enable us to ascertain not merely the extent of it, but the condition of its edges. When the vagina is not cicatrized, it is not generally difficult to obtain the information we desire: but when deformed by cicatrices, it will require both care and patience. By far the most satisfactory mode of making this examination, as shown by Dr. Marion Sims, is to place the patient on her face with the hips raised, or on her hands and knees, and then raising the perineum with a Sims dilator, the air will distend the vagina, and exhibit the entire canal perfectly.

In the majority of cases, little is to be hoped for from the efforts of nature; the borders of the wound become thickened and callous, and the case remains stationary during the patient's life. In some few cases, however, the result is more favorable; as, for instance, when the wound has been inflicted by a sharp instrument. In two cases under my care, where the wound was precisely at the insertion of the urethra into the bladder, and was followed at first by absolute incontinence of urine, a cure was obtained naturally. The wound slightly contracted, without healing, and the muscular fibres of the bladder assumed the office of a sphincter muscle, and closed the orifice, so that the patient could retain urine almost as long as previous to the accident, and could evacuate it at pleasure.

735. **Treatment.** — We cannot wonder that many methods should have been tried to remedy so offensive an accident, nor that so few should have succeeded, when we recollect the obstacle presented by the constant passage of urine. The probability of relief depends partly upon the situation, and partly upon the character of the fistula. When it is far back in the posterior wall of the bladder, and when there has been much loss of substance, a cure is seldom obtained; but when near the neck, we may sometimes succeed.

I shall now notice the principal plans which have been proposed.

1. *Desault's method*,[1] as it has been called, consisted in maintaining a catheter constantly in the urethra, so as to afford an outlet for the urine, and at the same time preventing its escape, by plugging the vagina. J. Cloquet has added a kind of syphon to the catheter. Chopart succeeded in curing a case by this means, where the wound was in the neck; but he failed in one where it was in the body of the viscus. Peu,[2] S. Cooper, and Blundell, each relate a case of cure.

There is no doubt that much relief may occasionally be derived from this plan. I had a case in which the patient was ultimately enabled to retain her urine for two hours, without dribbling, though the wound did not entirely close; but in some of the cases on record the wound completely healed.

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[1] Œuvres Chirurgicales, vol. iii. p. 299.

[2] Prat. des Accouchmens, p. 384.

There is this objection to the plan, however, that in many instances the patients cannot bear the catheter above an hour at a time.[1] I saw two examples where this circumstance proved a serious obstacle to the cure.

736. 2. *Cauterization.* — This is obtained by the repeated application of the nitrate of silver or the strong acids. Dupuytren, who I think first proposed the plan, used the "nitrate acide de mercure," or the nitrate of silver. Relief has occasionally been afforded by this means, but a cure is very rarely, if ever, effected. Where there is much loss of substance, it affords no chance. I have seen it fail repeatedly. However, Dupuytren, and Delpech, and Baravero, are said to have thus cured several cases.

The best mode of applying the caustic is by means of a fenestrated speculum, which will leave the upper surface of the vaginal canal exposed, or by Lalleman's "porte caustique." The caustic should be lightly applied, as the object is not to produce a slough, but merely a contraction.

737. 3. *Actual Cautery.* — If the loss of substance be slight, and the wound small, there is no doubt that a cure may be obtained by this means.[2] Dupuytren, who first proposed it, cured several,[3] Dr. M'Dowel, one;[4] Dr. Kennedy, two;[5] Mr. Liston, four or five;[6] and others have been equally successful. Dr. Colles has tried it successfully where the orifice was not too large, but without benefit where the fistula was extensive. I witnessed a successful case treated by Dr. O'Ferrall, of St. Vincent's Hospital. I also tried it in one case under my own care, but it failed, as I anticipated, on account of the large size of the opening, and equally in another very small one.

The facility with which the operation is performed will depend upon the situation of the fistula being more or less anterior. The patient may be placed upon her back, as for lithotomy, or upon her knees and elbows. Dr. Kennedy adopted the former; but I have found the latter far more convenient, and I think less offensive to the patient's feelings. The light can reach the part more readily, and the position of the operator is more convenient. The patient must be placed before a window, or a candle must be used. The next point is to dilate the vagina, so as to insure access to the wound, without contact with the vagina. This may be done by three brazen spatulæ, sufficiently long to reach beyond the rent, and broad enough to protect the vagina — or by a double-bladed-speculum. I have also used, with great facility and safety, a metal cylinder, closed at its extremity, but with an opening in the side, a little distance from the end, and corresponding to the fistula. A catheter should be passed into the bladder, and through the fistula, to guide the operator, and to keep the mucous membrane of the bladder from protruding.

Having these preliminaries adjusted, the cauterizing iron, at a white heat, should be *lightly* applied around the *edges* of the wound, and withdrawn. The dilators, or speculum, may then be removed, and the patient placed in bed. If it do not occasion irritation, it will be advantageous to allow the catheter to remain in the bladder. The patient should be kept quiet, and the bowels freed by medicine. A certain amount of local irritation generally succeeds, which subsides in the course of a few days; after which the operation may be repeated as often as necessary. The operation should not produce a slough, or the patient will not be benefited, but merely a corrugation or shrivelling of the edges. If we thus reduce the wound, so as to bring the edges in contact, adhesion may then take place, and the patient be cured. But it must in candor be confessed, that whilst it is not difficult or uncommon to benefit the patient to a great extent, a complete closure of the fistula is very rare.

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[1] Davis's Obsteteric Med., vol. i. p. 127.

[2] Jeanselme, l'Expérience, Jan. 1838.

[3] Sanson. Path. Méd.-Chir., vol. v. p. 294.

[4] London Med. and Phys. Jour., 1831.

[5] Dublin Jour. of Med. Science, vol. ii. p. 241.

[6] Lancet, June 23d, 1838.

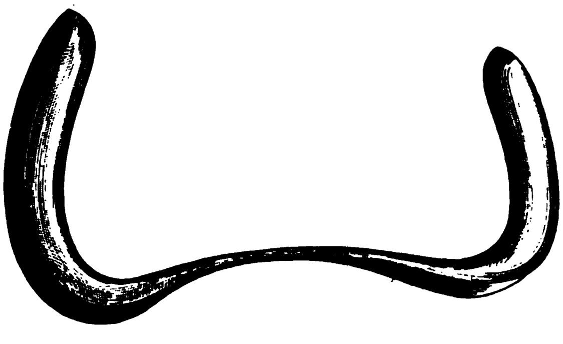
738. 4. The *Suture.* — This method is said to have been invented by Roonhuysen; at all events, it has been long known and practised by the profession, with varying results.

It has been performed with success by Dieffenbach, Blandin, Chanam, and Jobert;[1] by Sanson, who failed; by Deyber, who nearly, if not quite cured his patient; by Malagodi of Bologna, who has published his successful case; by MM. Lallemand, Dugès and Roux, who failed; and by M. Naegelè. Mr. Earle cured three cases by this means. Mr. Hobart, of Cork, formerly published a successful case,[2] and since states that he has perfectly cured at least ten by the suture. He says: "In reply to your letter, I have only to say, that many cases of vesico-vaginal fistula came before me within the last fifteen years, many of whom were cured, some relieved, and others not at all benefited. I think there were from ten to fifteen *perfectly* cured, and all by the same means." A successful case is related in the American Medical Recorder.[3] Dr. Every Kennedy has succeeded in diminishing the orifice several times; and in one case in which the twisted suture was used, the cure was complete. Mr. Hayward, of Boston, U. S., has published a very interesting case, which was perfectly successful.[4]

On the other hand, the late Dr. Colles, of Dublin (whose name alone is a sufficient guarantee for all that science, and skill, and care could do), allowed me to state that he has repeatedly tried the common interrupted suture, but though he has by these means lessened the orifice, he has never succeeded in closing it entirely: and this was the result under very favorable circumstances. He has also seen very unpleasant consequences result from the operation; hemorrhage (the edges of the fistula having been removed by the knife) to a great amount; fever, hectic, etc.

M. Naegelè has described an instrument, consisting of two small plates, joined at the back like the pages of a book, and fixed in a handle of steel. The anterior edges are brought together by a screw fixed in the handle, and the edges of the wound being included, are retained in apposition, and the lower part of the handle removed.[5] M. Lallemand has also invented one, which he calls a "sondeerigne," by which a similar effect is produced,[6] but, not having seen the instrument, I am unable to give a description of it.

[Fig. 178.]



Duck-billed speculum of Sims, slightly modified by Bozeman, (one quarter size.)

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[1] Lancet, May 12th, 1838.

[2] London Med. and Phys. Journal, vol. v.

[3] April, 1826, p. 410.

[4] Amer. Journal of Med. Sciences, Aug. 1839.

[5] Erfahrungen und Abhandlungen, etc., p. 389.

[6] Velpeau, Méd. Opératoire, vol. iii.

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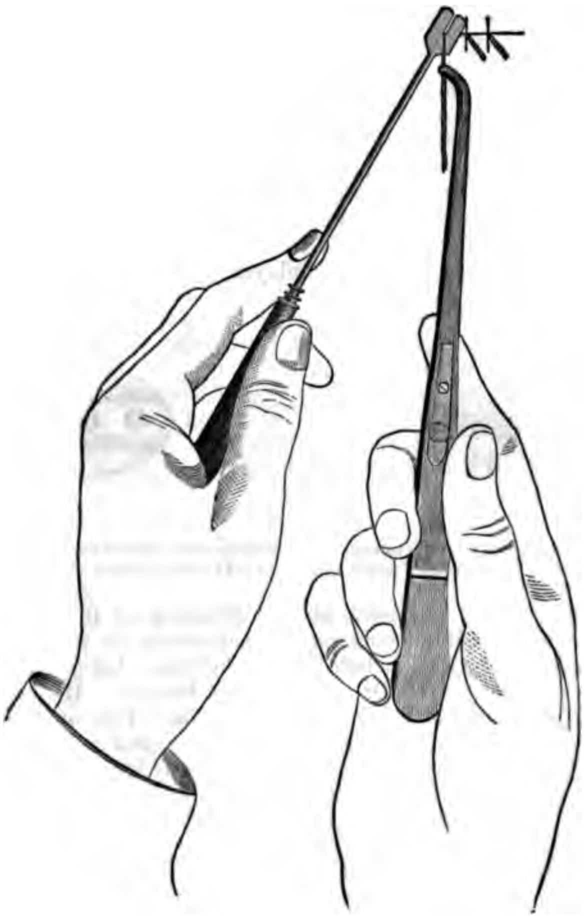
He has cured one case with it, partially cured another, but failed twice. MM. Langier and Lewziski have also contrived similar instruments.

Very recently, however, the improvements in the mode of operating and materials used, have given good hopes of success to a greater extent than we had ventured to hope. Many cures have been effected under the care of Drs. Marion Sims, Bozeman, Simpson, Baker Brown, Spenser Wells, Collis, Sawyer, M'Clintock, and others. I shall briefly mention the more important methods.

The first great improvement was the use of silver wire for the sutures by Dr. Marion Sims.[1] At first he used "clamps" to retain the wire, but latterly he has discarded them, and simply twists the ends of each suture together

[Fig. 179.]



The manner in which Sims adjusts and fixes the silver sutures. (After Sims.)

The advantage of the silver wire (and the same may be said of annealed iron wire) is that it does not cut out, nor excite suppuration, nor rust. The patient is placed in a prone posture, with the hips raised, the duck-billed speculum is introduced at the perineum, and, being raised, the whole canal is exposed. The edges of the fistula having been pared, a sufficient number of sutures, about $\frac{3}{16}$ of an inch apart, are inserted, and the ends being twisted, the edges of the wound are brought together, so that no urine can escape. He does not remove the wires before the eighth day; and he allows his patient a more liberal diet than usual. Dr. Sims deserves the credit of the silver wire sutures, the duck-billed speculum, and the S-shaped metallic catheter to be left in the bladder.

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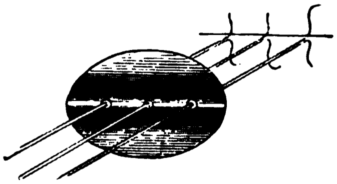
[1] Silver Sutures in Surgery. Anniversary Discourse, etc., 1858.

The next great step is also due to our American brethren. Dr. Bozeman, of Alabama,[1] acknowledging the claims of Dr. Marion Sims, and adopting after him the silver wire, speculum, and curved catheter, yet found a want of success in keeping the edges of the wound in steady apposition, and preventing the irritation of the wound by urine discharge, etc. To supply this want, he invented the "button shield," an oval plate of silver or lead not much thicker than cardboard, and of a size and shape to suit the fistulous opening. It is perforated along the centre with a row of holes to admit the sutures, the two ends going through one hole. When all have been inserted, the button shield is pressed down to the fistula, and the wires are drawn as tight as we wish, and retained either by split shot or perforated "saddles" squeezed flat by a strong pair of forceps. He has also, with great ingenuity, invented a variety of subsidiary instruments to facilitate the operation, for example, crooked forceps, bent knives, ligature adjusters, etc. The result in little more than two years has been that of twenty-four operations in which the button suture has been employed, only two failures occurred.

[Fig. 180.]



[Fig. 181.]

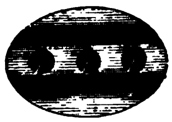


Fig. 180. Bozeman's "button" as it is being passed along the threads down to the wound. (From Bozeman.)
Fig. 181. Bozeman's "button-suture" finally applied and fixed with perforated shot. (From Bozeman.)

Dr. Maurice Collis proposed, as a modification of the older operation, that, instead of the edges being pared, they should be split with the knife, and the vaginal half alone included in the ligature; but in this suggestion he had been anticipated by Dr. Hayward, of Boston.[2] He used iron wire ligatures and portions of india rubber for quills. This operation was performed by himself twice, Dr. Sawyer, Dr. Thorpe, and two other surgeons. Two cases were completely cured, two were greatly improved, and two failed altogether. Dr. Collis has since used Bozeman's button shield.

Mr. Baker Brown[3] has published the history of nine successful cases treated on Dr. Bozeman's plan.

Professor Simpson, of Edinburgh,[4] whose zeal leads him to try every suggestion for the relief of suffering, has succeeded by Bozeman's operation in curing five cases. But not satisfied with our present means, he has endeavored to improve them. Instead of the solid button shield, he uses an oval ring of twisted wire, through the interstices of which the ligatures are passed, and being brought together over the intervening space are twisted by an admirable little instrument he has invented. By this means you can see the adaptation of the lips of the wound, and he believes that all movement of

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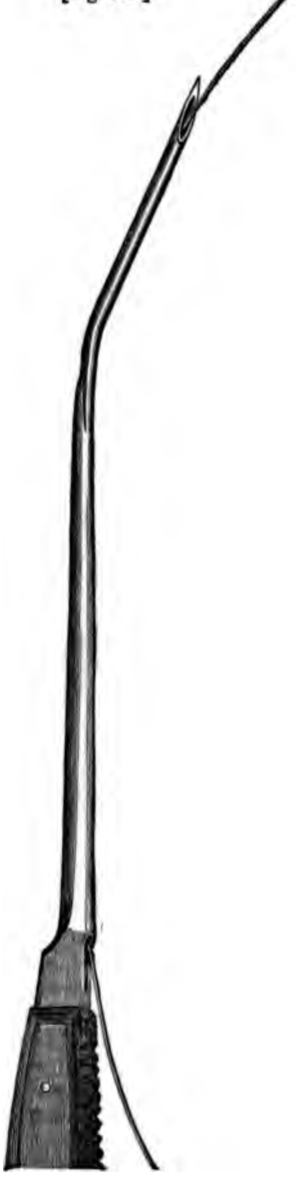
[1] Remarks on Vesico-Vaginal Fistula, etc., 1856. On Vesico-Vaginal Fistula, 1858.

[2] Surgical Reports, etc. p. 222.

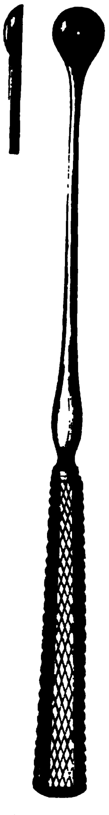
[3] On Vesico-Vaginal Fistula, 1858, p. 6.

[4] Med. Times and Gazette, 1859, Jan. 1st and 8th.

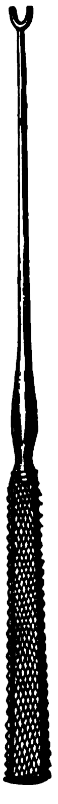
[Fig. 183.]



[Fig. 182.]



[Fig. 184.]



[Fig. 185.]

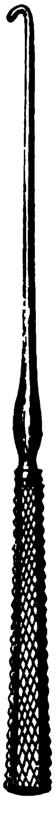


Fig. 182. Bozeman's suture-adjuster. The long figure gives a face view of the instrument, the short figure gives a lateral view of its extremity (half-size).

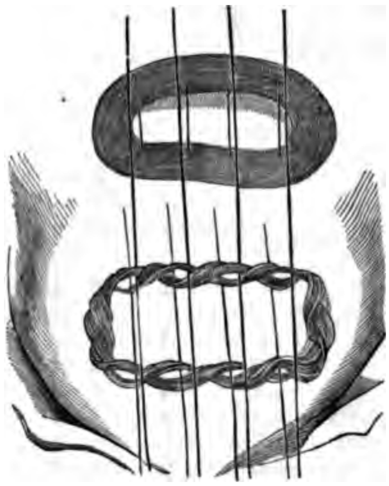
Fig. 183. Tubular needle for passing wire threads through the lips of vesico-vaginal fistulæ. A wire is represented as passing through the tube. The figure is of full size—the extremity of the needle, looking thicker and larger than it really is. Only the commencement of the handle is represented in the woodcut.

Fig. 184. Fork or pulley used in drawing through the wires to prevent them from cutting the vaginal mucous membrane above the wound (half-size).

Fig. 185. Blunt hook for directing the point of the needle (half-size).

one upon the other will be prevented. I confess from all I have seen I prefer the button shield. He has also invented an improved needle, which acts very nicely. It consists of a hollow tube terminating in a fine needle point, and bent or curved about an inch from the end. Through this the wire (he uses iron wire, as being cheaper and quite as good) can be passed before or after the opposite sides of the fistula have been pierced by it, and when protruded through the open end, it can be seized and held with the forceps, and the needle withdrawn.

[Fig. 186.]



[Fig. 187.]

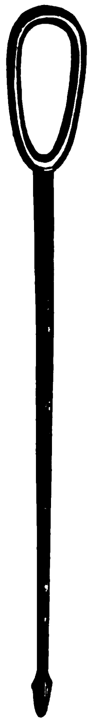


Fig. 186. The iron-wire splint finally adjusted as it is being passed along the threads down to the pared wound.

Fig. 187. [Dr. Coghill's instrument for finally tightening and fixing the suture. In using it, one end of a wire having been brought through one of the small tubes which are on the sides of the instrument near its lower extremity, and the other through the opposite of these tubes, the instrument is pushed down close to the lower bar of the splint, both ends of the wire suture being now drawn quite tight, so as to make the splint compress and consolidate the parts, a turn of the instrument suffices to fix them there. To make sure of this, however, a turn or two more may be given, when the wires are to be clipped off with a pair of stout sharp scissors, close to the point of the instrument.]

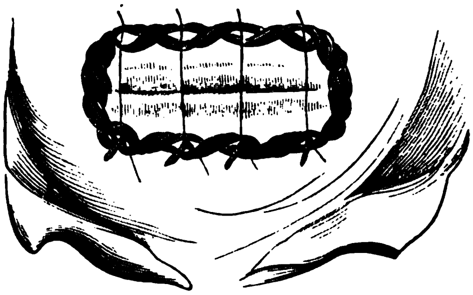
With his usual research he has discovered that a Mr. Gossett, of London, in 1834, used ligatures of gilt wire in cases of vesico-vaginal fistula, and though this was prior to Dr. M. Sims' adoption of them, to my mind it does not diminish one whit the credit due to him.

Lately Dr. M'Clintock has performed Bozeman's operation once with perfect success, and once with such an amount of success as gives hopes that another operation will complete the cure.

Dr. Beatty has also performed the same operation with complete success, with the slight modification that instead of one row of holes in the button shield, two rows were made, and the opposite wires twisted over the intervening space. This is much more easy than fixing the wires by split or perforated shot or saddles, and answers quite as well.

Now, as to the time and method of operating. The best time will be about a week after a menstrual period, and it should be done on a bright day in as good a light as possible. The patient's bowels should be freed previous to the operation. The instruments required are, the duck-billed speculum, knives straight and curved, toothed forceps, three or four needles of different kinds, iron or silver wire, the little fork, the ligature and suture adjuster, the twister, long scissors. forceps of different kinds, and a strong and long pair of pliers, and small sponges on rods. The button shield (which I prefer to Dr. Simpson's wire oval) each one should make for himself of thin lead to suit the direction and size of the fistula, and pierce it with just so many holes as he intends to apply sutures. If two rows of holes are made, neither saddles nor shot will be necessary; but if only one, little saddles may be made of bits of lead perforated.

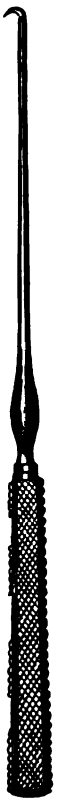
[Fig. 188.]



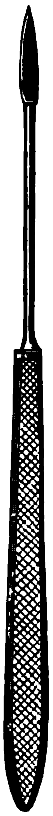
Shows the iron-wire splint finally adjusted and the ends of the stitches twisted and secured across the lower bar of the splint.

The patient may be placed on a table in a prone position with the hips raised, or she may kneel on the table or stand, with the shoulders lower than the hips. These latter positions are generally best, I think; but if we wish to give chloroform, she must lie on her back in the position for lithotomy, and in some cases this is the most convenient position. A trial should be made of each, and the best position chosen. Then raising the perineum with the speculum, and separating the labia widely with a long-toothed forceps and a knife, a slice should be taken from the entire circumference of the fistula, or the edge split entirely round. Very great care must be taken that we have a raw surface with no portion of the old surface remaining, and as the bleeding obscures our view, we may derive assistance by applying tincture or decoction of matico from time to time so as to arrest it for a moment. When we are satisfied with this part of the operation, at once the most difficult and the most important, the patient may be allowed to rest awhile by changing her position, whilst the operator sees that he has all ready for the remaining part of the operation. Placing the patient once more in position and exposing the parts by the speculum and fingers of assistants, or retractors, the ligatures are to be passed in at some distance from the edge of the wound, and not through into the bladder, but emerging at one edge to be passed through the other edge and out beyond it. With the small hook or forceps they are to be removed from the needle, and drawn further through. This is to be repeated as often as necessary. It is better to have too many than too few, and unless we use Dr. Simpson's needle (which we can scarcely do when the fistula is vertical), it is well to have as many needles threaded as we intend to have sutures. Having inserted the sutures, the next thing is to assort them in pairs by a little instrument Dr. Bozeman contrived, and then running the suture adjuster down each pair of ligatures, the lips of the wound will be drawn together and we can see whether they are nicely adapted. If we are satisfied, the ligatures are next to be passed through the holes in the button shield, and secured either by shot, saddles, or by twisting with Dr. Simpson's instrument; we must be careful that the shield sits firmly and closely on the wound, and that the sutures are tight enough, but not too tight. The wire may then be cut close to the shield, and the ends bent down and the operation is completed, having generally occupied from an hour to an hour and a half or two hours. The patient should be carried to bed, and a catheter passed and so fixed that it will not slip out. Dr. M. Sims' crooked catheter remains in very well if the patient lie on her side; it should be removed and cleansed every day; and if it escape, it must be instantly re-introduced.

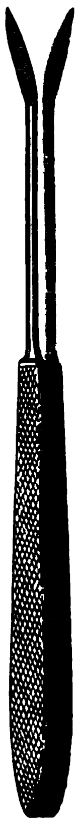
[Fig. 189.]



[Fig. 190.]



[Fig. 191.]



[Fig. 192.]

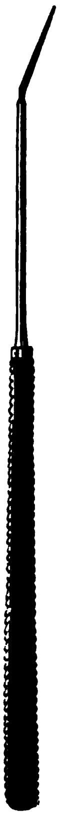


Fig. 189. The tenaculum, or sharp hook used for catching up the edge of the mucous membrane of the vagina around the fistula (half size).

Fig. 190. Straight knife used for paring the edges of the fistula (half size).

Fig. 191. Bent knife used for paring edges of the fistula (half size.)

Fig. 192. Lateral view of the same (bent) knife to show the angle at which it, the blade, is bent (half size).

Two grains of opium should be given immediately, and a grain three times a day for two or three days; the object being to lock up the bowels, but I agree with Dr. Simpson that it is probable that the beneficial effects are not limited to producing constipation. Moderate diet may be allowed, but the patient must remain in bed. The bowels need not be disturbed for seven or eight days; but I think it better to have them evacuated before we remove the shield. As neither the shield nor ligatures occasion any irritation, we need not be in a hurry to remove them, and it is clearly better to leave them unnecessarily long than take them away too soon. The eighth or tenth day is quite soon enough. All that is necessary is to clip across the wires close to the shield with the scissors, and with the forceps remove the shield. In some cases it will be advantageous to leave the wires a few days longer, and then very quietly withdraw them. The vagina should be syringed with cold water every day from the beginning, but no attempt should be made to see whether any orifice remains until a few days after the removal of the shield. If no urine escapes per vaginam we may rest satisfied, and in a week or so carefully examine the cicatrix with a blunt instrument, keeping a silver catheter in the bladder meanwhile. If no unhealed spot be discovered, we may still further test its soundness by injecting the bladder full of cold water; if none escape by the cicatrix (and we can see if it do), we may be satisfied that the cure is complete. But there is a source of confusion and doubt which I may mention. After a catheter has remained so long in the bladder, the sphincter and urethra lose their power to a certain extent, and urine may dribble along outside the catheter, leading us to fear it is escaping through the fistula. Or, as in a patient of Dr. M'Clintock's, the power of these parts may be lost more completely, so that when she is allowed to get up, she can retain urine only for a short time, and, without examination, we should conclude that the operation had failed. Inspecting the bladder, and observing whether any escape through the fistula, is the true test in these cases. The urethra by degrees recovers its retentive power.

739. 5. Dr. Blundell saw a fistula in the neck of the bladder, near the urethra, cured by laying open the urethra to the rent, and then healing it up, as is done in ordinary fistula. Dr. Porter, of the Meath Hospital, performed a similar operation, which terminated successfully.

740. 6. "*Elythro-plastie.*"—This name is given to the operation by which a portion of integument is taken from a neighboring part, and applied to the vesico-vaginal fistula, and retained by sutures; the old connection being maintained until union has taken place. It is exactly similar to the rhino-plastic operation for repairing noses. It was suggested by Velpeau, but first practised by Jobert. Of his four operations, one patient was cured at once, one by a second operation, one died, and with one it failed. M. Roux did not succeed with it. I am not aware that any other surgeon has tried it.

741. 7. *Closure of the Vagina.*—When using the caustic for the cure of vesico-vaginal fistula, in the year 1833, M. Vidal de Cassis chanced to touch the vaginal mucous membrane with it; this caused considerable inflammation, and on making an examination subsequently, he found the sides of the vagina adherent. The patient also observed that the dribbling of urine had entirely ceased. Unfortunately, a careless examination was afterwards made, and these adhesions were destroyed. But the hint was not thrown away; for on the next occasion, in the same year, M. Vidal de Cassis attempted to relieve the fistula in this way, and was perfectly successful, until the clumsiness of an assistant destroyed these adhesions also. There is no doubt that in many cases this would be found a valuable means of relief. Caustic of any kind will answer the purpose of exciting inflammation, though adhesion may not always take place. I have seen a circle of the mucous membrane removed, and the parts brought together by suture, for the purpose of closing the orifice of the vagina, but union did not take place.

When we have recourse to this method, care should be taken to leave a very minute opening for the escape of the menstrual fluid, if menstruation have not ceased.

742. 8. *The Plug.*—If none of the means hitherto described afford a probability of cure, or fail upon trial, it is at least a comfort to know that we can still remove a portion of the distress caused by this frightful complaint, provided the irritability of the vagina be not too great to bear a plug.[1] Various cases of relief by this means are on record. Dr. Gooch, in 1814, suggested to Mr. Barnes, of Exeter, the employment of an india rubber bottle, of sufficient size to fill the vagina, and having upon one side of it a small piece of sponge, to be applied to the fistulous opening. Mr. Barnes used this with great benefit to his patient.[2] M. Dugès has proposed a similar plan, but the pessary was made of different materials.[3] Dr. Evory Kennedy has succeeded in taking casts (with wax) of the vagina, with the fistula, in several cases; and from them he made moulds, and had caoutchouc bottles cast in the moulds. These were large enough to fill the vagina, and to close both the fistula and the outer opening, so as entirely to prevent the escape of urine. I have attained the same object by means of a piece of sponge covered with thin bladder. It should be large enough to fill the vagina, and of a suitable shape. A narrow neck, of the dimensions of the vaginal orifice, is to be formed, by wrapping it with twine, which is to be covered with lint. The whole has much the shape of an egg-cup. It should be dipped in oil previous to being used, and then it can be easily introduced, and the stalk filling up the external orifice, no urine can escape. It can be removed and replaced by the patient herself.

Various other suggestions have been made, but either of these plans will relieve the patient from the constant dribbling and offensive odor, and will allow the excoriations to heal.

If the patient cannot pass water with the plug *in situ*, she should learn to withdraw it and re-introduce it herself. Dr. Burns states that "Dr. Balmanoo showed me a patient who derived much comfort from having a hollow tin globe, like a pessary, inserted into the vagina. It was perforated at the upper part, like a pepper-box, and from the under a catheter descended, which entered into a flat flask, suspended between the thighs. Little or no urine escaped by the vagina."[4]

743. III. VESICO-UTERINE AND VESICO-UTERO-VAGINAL FISTULÆ.—M. Jobert, in his recent work,[5] has entered very fully into some variations from the ordinary vesico-vaginal fistula, to which it is right that I should briefly allude. The first of these is the *vesico-uterine*—when the opening is directly from the bladder through the uterine parietes, without injury to the septum between the bladder and vagina; and the second—the *vesico-utero-vaginal*—in which there is a fistulous communication between the bladder, uterus, and vagina. Dr. Bozeman doubts the existence of the former, but I have proof that he is mistaken.

The extent of destruction in either case varies very much: there may be a small perforation with smooth edges, a ragged wound, or very extensive destruction of the parts involved.

744. CAUSES.—In the majority of cases, so far as we know, the method of production is mechanical in the first instance. A large fœtal head, a tight pelvis, or a prolonged second stage of labor, may give rise to inflammation and sloughing from pressure, and if the cervix uteri have been brought down before the head into the pelvis, pressure on this part may determine the complication of the uterus with what would otherwise be a

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[1] Davis's Obstetric Med., vol. i. p. 128.

[2] Med.-Chir. Trans., vol. vi. p. 586.

[3] Duparcque, Ruptures de l'Utérus, p. 389.

[4] Midwifery, p. 93, note.

[5] Traité des Fistules Vesico-Utérines, etc. Paris, 1852.

simple vesico-vaginal fistula. No doubt the awkward or violent use of the forceps may also inflict this injury.

Dr. Simpson has shown, however, that vesico-uterine, vesico-rectal, and utero-intestinal fistulæ, may be the result of a very different cause—viz., of pelvic abscess opening into the bladder and uterus, the bladder and rectum, or the uterus and some part of the intestinal canal. The cases he relates are very interesting, and that of vesico-uterine fistula the more so, from a cure having apparently taken place from spontaneous contraction of the openings.[1]

Perhaps a *post-mortem* examination alone could have made us, in the first instance, acquainted with the exact nature of vesico-uterine fistula; but now that it has been ascertained, there is no real difficulty in making out the case. There is incontinence of urine; a careful examination with the finger in the vagina and a catheter in the bladder will show that in this canal there is no breach of surface: an examination with the speculum allows us to see the urine welling up through the os uteri, and finally if we pass the catheter through the fistulous opening in the bladder, we can touch it with a metallic sound passed into the cervix uteri. In a case which came under my care there was no difficulty in coming to a positive conclusion by these means.

Vesico-utero-vaginal fistulæ present the same symptoms as the more simple vesico-vaginal fistulæ, only that, on examination, we find a greater extent of destruction, the anterior lip of the os uteri being more or less destroyed. The urine escapes in every position, and the catamenia are discharged mixed with urine.

The *prognosis* is more serious, inasmuch as the uterus has participated in the injury; it is possible in either variety, but especially in the first, that the sloughing may extend so far as to compromise the life of the patient.

745. TREATMENT.—1. *Prophylactic.* It is as yet an unsettled question how far we may be able to prevent so melancholy a consequence of labor. When we recollect that the cause is, first, pressure of the cervix between the head of the child and the symphysis pubis, and secondly, general pressure of the vaginal parietes from the head being too long detained in the pelvic cavity, we cannot doubt that, in some cases at least, we have the remedy in our own hands. If, when the os uteri is dilatable, the anterior lip be gently pushed up above the head during an interval, and maintained there during a pain, it will escape injurious pressure, and this is not difficult to accomplish. Again, a labor prolonged in its second stage, so much as to occasion inflammation and sloughing, will generally be found to have exceeded the period when assistance becomes necessary; and if the forceps be admissible, they will be safer in careful hands than the delay. When the forceps cannot be used, the alternative is either further delay or craniotomy; the former of which may incur the risk of this injury, which should therefore always be taken into consideration in our decision.

746. 2. *Curative: a.—Vesico-uterine fistula.* An attempt has been made, by plugging the canal of the cervix uteri, and keeping a catheter constantly in the bladder, to prevent the passage of the urine through the wound, and so afford it an opportunity to heal. Again, it has been advised to apply the nitrate of silver to the fistula, but, to say nothing of the difficulty, neither of these plans appears to have been successful. One of M. Jobert's plans is as follows: he dissects off the reflected vagina from the anterior lip until he arrives at the fistula, the borders of which are to be refreshed with the bistoury, and sutures applied in the situation most suitable to the direction of the wound. A second method consists in an attempt to close the communication between the uterus and vagina, leaving open

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[1] Ed. Monthly Journal, Dec. 1852, p. 532.

that with the bladder, by first dividing the cervix laterally, then dissecting the vagina from the anterior lip, and uniting it by section to the posterior lip. He gives a case of complete success by this latter process.

In the case which came under my care I adopted a simpler plan; I pared out the inner surface of the cervix uteri, and put in four silver sutures with Bozeman's button shield, which I removed on the fourteenth day. I found the orifice much less, but not entirely closed. I intended to repeat the operation, but as the patient found she could retain urine for three hours without any escape she felt her condition so much improved that she declined any further attempt. Since then I see that a German physician, Dr. Simon, has succeeded in completely curing a case in this manner.

b. Vesico-utero-vaginal fistula.—In this complication M. Jobert proposes three different operations. The first consists in dissecting off the vagina from the remains of the cervix, then paring the borders of the fistulous opening, and lastly in uniting by suture the remains of the cervix with the edges of the vesico-vaginal opening; the second, in dissecting off the vagina from the cervix, in dividing this latter at each side, and after refreshing the edges of the fistula, in uniting by suture the posterior lip of the os uteri to the edges of the fistula. The third differs only in a depression being made in the anterior lip to fit more accurately the edges of the vesical fistula.[1] If necessary, incisions may be made laterally in the vagina, or semicircularly at its orifice, to relieve the strain upon the ligatures. M. Jobert gives the details of four cases, three of which he states were cured.

747. IV. RECTO-VAGINAL FISTULA.—There can be no doubt that recto-vaginal fistulæ are less frequent, and more easily cured, than those fistulæ which involve the bladder. There are a few cases, but very few, on record, where this defect was congenital; most commonly it arises from causes connected with labor, as in the case of vesico-vaginal fistulæ, that is, from too prolonged pressure of the child's head giving rise to inflammation and sloughing, or from the awkward use of instruments; and in addition it may occur as a laceration, or from disease of the rectum, or from a pelvic abscess. This injury may exist alone, or it may be combined with a vesico-vaginal fistula.

The extent, situation, and direction of the wound may vary to any extent, but in almost every case the sphincter ani is uninjured. When we examine the parts, the mucous membrane of the vagina and rectum is red and congested, the mucous follicles unusually developed, and the septum thickened when the injury is recent, but when of long standing, the edges are hard and cicatrized.

748. SYMPTOMS.—The edges of the wound, at least when recent, secrete a certain quantity of matter, which is discharged by one or other outlet. When very recent, the vagina may be found inflamed to a greater or less extent, and giving rise to a purulent discharge. But the characteristic symptom is the escape of air or fæces through the vagina, which, however, may be modified by various circumstances. When the fistula is small or oblique, air may escape, but the fæces will be retained unless they are very fluid. Unless the opening be direct and large, solid matters are rarely passed, but their presence at the orifice is a continual irritation. When the opening is of sufficient size, fæcal matter and gas escape involuntarily, and the condition of the patient is most pitiable. Even if the bodily injury did not affect her health, her distress of mind in addition is generally sufficient to do so; she is cut off from society, and in the solitude of her own sufferings, her spirits and health are apt to deteriorate.

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[1] Traité des Fistules, etc., p. 70.

In some cases, however, matters do not become so desperate, although such instances are not common. For example, when the injury is small in extent, and the result of laceration rather than sloughing, it may heal with quiet and care; or, if small, it may be closed by granulations or by the formation of something like a flap or valve. I had a patient who had a small recto-vaginal fistula for several years, through which nothing passed unless she took physic or had a diarrhœa, and from which she suffered very little annoyance.

749. TREATMENT.—The methods of cure do not differ much from those I have enumerated for vesico-vaginal fistula; they are, however, more easily applied. These are, 1, cauterization; 2, compression; and 3, the suture. Whichever we try, we must remember that the entire fistulous opening must be included.

When the fistula is small, cauterizing by the acid nitrate of mercury, nitric acid, nitrate of silver, or the actual cautery, has succeeded in the hands of Dupuytren, Amusat, and others; and if it fail, we may pare the edges of the wound from the rectum to the vagina, and apply sutures, with absolute quiet and rest. Cases of cure by these means have been recorded by Noël, Saucerotte, Fielding, Portal, Mott, etc., etc.

M. Cullerier, Sr., proposed compression, and invented an instrument for the purpose, which he said succceded; but it seems to have failed in other hands.

The insertion of a seton has been tried by Dr. Barton, of Philadelphia, in the case of a recto-vaginal fistula following an abscess, and with success, but it can only be suitable in very rare cases.

As M. Jobert observes, although some or all of these methods may succeed when the opening is moderate, there remains a class of cases in which they must fail, because of the extent of the mischief. For such cases he has proposed a plan, which he terms "*autoplastic par glissement*," which consists in renewing the edges of the fistula, in the insertion of the interrupted suture, in relaxing the surrounding tissues by incisions, in appropriate regimen. The patient being placed on her back, with the thighs drawn upwards, the superior wall of the vagina is to be raised by a univalve speculum, and the lower depressed so as to bring the fistula into view. Its borders are to be removed by the knife, and three or four sutures, according to the extent of the opening from the rectum to the vagina, inserted through the parietes of both vagina and rectum, guided and guarded by the finger in the latter canal. When all the sutures are inserted, the parts are to be cleansed, and the sutures tied. Then there are to be made incisions through the vaginal parietes, for the purpose of taking off the strain from the sutures, and these may be longitudinal, transverse, or semicircular according as either is likely to afford most relief. After the operation, the patient must be kept quiet, and the bowels constipated by diet or medicine, until the sutures are removed on the sixth day. Every day the vagina must be syringed with emollient fluids, and when the union is complete, the bowels may be freed by enemata.[1] M. Jobert gives three very interesting cases in which the operation was successful. The chances of cure will be greatly increased, nay, I almost think rendered certainties, by the employment of wire sutures near together and Bozeman's button shield. After the edges have been well pared in the whole of their thickness, the sutures should be inserted at a sufficient distance from the margins, and should embrace the walls of the rectum as well as the vagina. Then they may be passed through the double row of holes in the shield, and twisted tight enough, but not too tight. The shield may be left on a fortnight, and the bowels (which must be constipated by opium) should be freed by an enema the day before we remove the shield.

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[1] Traité des Fistules, p. 340.

750. V. **Laceration of the Perineum.** — When this accident is of slight extent, it may not interfere with the comfort of the patient; but when extensive, it will be a cause of constant distress; and in either case the proper cure of the wound is important; as, if callosities form, or irregular cicatrices, much impediment may be offered in subsequent labors. It is an accident much more common with first labors than afterwards.

It will be recollected that when the head of the child descends so as to fill the cavity of the pelvis, it necessarily makes pressure upon the lower part of the rectum and the sphincter ani; that it then receives a direction forwards and downwards, and successively distends the central space of the perineum and its anterior border. When the perineum offers much resistance, as with first children, the mucous membrane of the posterior wall of the vagina, owing to its laxity of connection with the subjacent tissue, is partially everted and forms a kind of artificial perineum. This is almost always torn, but the rent may extend no farther; and if we examine the day after delivery, we shall find this mucous membrane retracted, and the true perineum untouched. This is not to be confounded with the laceration of the true perineum, of which we are about to treat.

751. The *situation and extent* of the rupture vary according to the cause and the circumstances of the case.

1. It may commence at the anterior border, and extend *to* the sphincter ani, and this is the most frequent extent.

2. The rent may involve the entire perineum, and extend through the sphincter ani, laying the cavities of the rectum and vagina into one.

3. The central space of the perineum is sometimes ruptured, leaving the anterior edge (the fourchette) and the sphincter ani untouched. Cases are related by Hernu, Coutouly, Lachapelle,[1] Meckel,[2] Lebrun,[3] Thiebaut,[4] Frank, Martin,[5] Moschner,[6] Jungmann, Marter de Konigsberg,[7] Trinchinetti,[8] Merriman,[9] Waller,[10] Douglas,[11] Jobert,[12] Ellis,[13] and Thatcher.[14] And a case occurred in this city. Dr. Simpson has related the case of a perineal fistula, the consequence and proof of this occurrence, continuing till the patient's death, a year afterwards.[15]

The rent may run along the central raphe of the perineum — on one side — diagonally — or in the form of the letter V or Y. In most of the above cases, the child actually passed through the central opening; but in some cases, by careful management, it was transmitted through the natural orifice, without rupture of the fourchette.[16]

4. The recto-vaginal septum, sphincter ani, and part of the perineum may be torn, so as to permit the transit of the child, leaving the anterior portion of the perineum entire.

752. **Causes.** — The accident may arise from a deviation from the ordinary mechanism of parturition; from mal-conformation of the passages or soft parts; from mal-presentation; or from mismanagement.

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[1] Duparcque, Ruptures ou Déchirures, etc., p. 368.

[2] Neue Jour. für die Chir., vol. iv., 1811.

[3] Annals de Méd. Phys., July, 1825.

[4] Jour. de la Soc. de Méd., vol. xxxiv. p. 178.

[5] Arch. Gén. de Méd. vol. xxxiv.

[6] Bull. de Ferrusac.

[7] Siebold's Journal, vol. xi. p. 726.

[8] Obs. sur l'Accouch. diff., Milan, 1819.

[9] Synopsis of difficult Parturition, p. 263, 4th ed.

[10] Waller's Note in Denman's Introduction, p. 36.

[11] Dublin Hospital Reports, vol. iii.

[12] Bull. de la Soc. Méd. d'Emulation, 1822.

[13] Amer. Jour. of Med., Jan. 1849, p. 260.

[14] Edin. Monthly Jour., Jan. 1851.

[15] Edin. Monthly Journal, No. i. July, 1855.

[16] Denman's Introduction to Midwifery, p. 86.

1. If the *sacrum* be too *perpendicular*, the head of the child, instead of receiving its direction anteriorly, in the direction of the axis of the lower outlet, will be forced downwards upon the posterior portion of the perineum.

2. If the *arch of the pubis be too acute*, so as to prevent the presenting portion filling its upper part, extraordinary dilatation of the orifice of the vagina will be necessary, and the head will be pressed with unusual force upon the anterior part of the perineum.

3. A similar effect is said to be caused by a *thickened state* of the *urethra* and circumjacent parts, in the arch of the pubis.

4. The *too rapid passage of the head* may be attended with this accident. This may depend upon the extraordinary violence of the pains, or upon the small size of the head, which prevents its receiving the successive changes of direction from the plane surfaces of the pelvis, and the changes in the axes of the cavity and lower outlet.

5. *Exostosis* in any part of the pelvic cavity may so act upon the direction in which the fœtal head is propelled, that rupture of the perineum may result.

6. *Excessive breadth of the perineum*, by receiving the force of the descending head in its centre, may be a cause of laceration, because the head rests in the centre, and distends it, instead of gliding forwards to the anterior edge.

7. *Rigidity* of the perineum, or an old cicatrix may resist the dilating power of the head, and ultimately give way under the employment of greater force.

8. The tissue of the perineum may be *weakened* by disease, or by too much pressure, so as to offer little or no resistance.

9. *Occlusion* of the lower outlet by the *hymen*. As this membrane, though much thinner than the perineum, is far less distensible, if it do not give way, the perineum may. I attended a case in which the hymen resisted the pressure of the head (with strong pains) for two hours after the perineum was perfectly distensible, and in which there was every probability that the perineum would have been lacerated, had not the hymen ruptured. Laceration of the hymen may also be extended into the perineum.

10. *Mal-position* of the child's head, by presenting a longer diameter than usual to the lower outlet, may give rise to this accident.

11. *Mal-presentations.*—Face presentations, involving the passage of the head in its longest diameter over the perineum; breech, or footling cases, which do not receive a proper direction so readily as the head, may also lacerate the perineum. Dupuis relates a case, where one foot came through the vagina, and one was forced through the perineum.

12. The accident may arise from the woman being *awkwardly placed* for delivery, or from her *starting away* from the attendant; or from her *exerting too much voluntary force* at the time the head passes through the lower outlet.

13. The perineum may be torn, in consequence of *want of care when instruments are used.* They ought generally to be removed just as the head passes through the vaginal orifice.

From this detail of the causes which may produce or predispose to laceration of the perineum, it will be seen that it may not always be in our power to prevent its occurrence.

753.—SYMPTOMS.—If the laceration be very slight, no ill consequences will ensue; the parts will either heal or contract, so that an examination would scarcely reveal the fact; if it extend to the sphincter, the patient may feel a want of support at the lower outlet, and a sense of "falling through;" but even in such cases, such is the wonderful reparative power of nature, the mischief is often remedied. I have seen many cases in which at first there seemed no prospect of relief but in an operation, recover and suffer no inconvenience. On examining such cases after recovery, I found the vaginal orifice not much larger than natural, but more posterior, with its borders thickened and contracted as if in process of and to facilitate contraction, the vulva had been somewhat drawn backward. I am now so satisfied of this as a not unusual process, that unless I had the opportunity of inserting sutures within thirty hours after delivery, I should postpone all operative interference for six months or more. It is said to influence subsequent cohabitation, and though I doubt it, may favor procidentia of the uterus.

If the recto-vaginal septum be torn, the condition of the patient will be very pitiable. The fæces (for some time at least) pass through the vagina involuntarily, and the utmost attention to cleanliness will not suffice to prevent the offensive smell, which renders the patient an object of disgust to herself and her friends. The lochial discharge passing over the wound will for a time prevent any natural efforts at cure; and the edges may become callous, or degenerate into ulceration.

754. TREATMENT.—1. *Preventive management.*—A few words may not be misapplied in pointing out the best mode of preventing this occurrence.

1. Defects in the passages, which render the mechanism of expulsion inefficient, may often be remedied by the application of the hand in such a manner as to give a direction forward to the head.

2. Direct support should be given to the perineum when distended; but this is frequently carried to excess, and produces the accident it is intended to prevent; it should be moderate and gentle, just so much as to support the parts, but no more. I must altogether object to any attempt to retard the passage of the child, as erroneous in theory, and mischievous in practice.

3. When the perineum is rigid and undilatable, benefit may be derived from fomentations with hot water, the use of warm oil, lard, or pomatum.

4. Under no circumstances is it justifiable to dilate the external orifice with the hand, as formerly recommended; on the contrary, instead of drawing back the perineum, it ought to be carried forward.

5. If laceration be threatened in consequence of the persistence of the hymen, it may be incised with a blunt-pointed bistoury.

6. The patient should always cease forcing, and cry out or remain perfectly quiet during the exit of the child.

755. 2. *Curative treatment.*—Slight cases, as I have said, will generally heal without assistance. Even when the rent is more extensive, a cure may be effected without further interference than great cleanliness, keeping the patient in one position, so as to preserve the edges of the wound in contact, and constipating the bowels after free purgation. If this do not succeed, we are advised to use a degree of compression, passing a binder around the hips, and a pad on either side of the perineum, so as to secure the apposition of the lips of the laceration. Strips of adhesive plaster have been applied, but they do not answer. In many cases either of these plans has succeeded, but in many cases also they have both failed, especially when the recto-vaginal septum is involved. However, we have still another resource—

In *the suture*, which was first proposed by Ambrose Paré, and practised by Guillemeau, La Motte, Saucerotte, Trainel, Noël, Dieffenbach, Roux, etc. Before this can be attempted, however, the primary inflammation must have subsided; nor is it forbidden, even though a considerable time should have elapsed. M. Montain cured a case on which he operated thirty-six days after delivery, and others have succeeded at a more distant period.

Three different kinds of suture have been adopted—the *interrupted*, the *twisted*, and the *quilled* suture. Osiander, Dieffenbach, etc., succeeded with the *first*, but according to Duparcque, the success and failure have been nearly equal. Mr. Alcock cured one,[1] and Mr. Rayer two patients in this way. Dr. Mettauer,[2] of Virginia (U. S.), succeeded with metallic sutures; they were introduced, and the parts approximated, by twisting the ends together. They were removed in six weeks, and union found to have taken place. The great objection to the interrupted suture is, that the lips of the wound are not closely applied in the whole extent, and the union is often partial.[3]

The same observation may be applied to the *twisted suture*, although it has succeeded with Morlanne, Saucerotte, Noël,[4] Dieffenbach,[5] etc. M. Langenbeck's method of operating consisted, 1, in separating for some little distance the anterior wall of the rectum from the posterior wall of the vagina; after removing the surface of the laceration, in applying sutures, beginning at the rectum; 3, in including the angles of the torn vagina in the last suture, at the fourchette, by which means the canal of the vagina is completed, and any discharges carried off; 4, in tightening all the sutures after all have been inserted; 5, in taking off the strain upon them, by making an incision through the skin on each side of them.[6]

M. Jobert has used a new kind of suture; "after paring the edges of the wound, he threads a broad lace lengthwise through them, and then drawing the lace, he pinches all the edges to a point"[7] precisely as the mouth of a bag is closed by drawing the string. One case of cure is quoted.

M. Reybaud passes a row of pins through the pared edges of the fissure, with the points to the vagina, which are to be guarded by slips of gutta percha; the edges of the fistula are to be brought together by tying the corresponding pins' heads with waxed thread.[8]

The *quilled suture* is evidently better adapted for the purpose, as the entire surfaces of the laceration may be brought into contact. Dupuytren succeeded once, Roux and Dieffenbach several times, M. Dubois failed, but Mr. Davidson succeeded completely. He thus relates the case:[9] "On the 6th of November, 1838, in company with Dr. Henry Davis, I performed the operation in the following manner: I passed deeply a strong double ligature, by means of a common curved needle, close by the edge of the rectum, and another, rather more than half an inch from the first, towards the vagina; after which I pared the edges of the wound, which I had not previously done, that I might not be annoyed by the oozing of blood, so as to be enabled to place the ligatures more accurately. The ligatures being introduced, I employed, as cylinders, two pieces of elastic gum catheter, about an inch and a half in length, one of which was placed in the loops which the double ligature formed on one side, and the other between their separate ends, tying them firmly upon the cylinder. Baron Roux found, in his cases, that the use of the quilled suture caused an eversion of the edges of the wound; to remedy this, he had recourse to several small sutures, at different points between the different ligatures. To effect the same object, and also with a view of keeping the divided parts more closely and firmly in contact, I adopted the following plan, the materials for which I had prepared previously to the operation: I armed a curved needle with a piece of narrow tape, four inches long, having a knot at one end; this was passed down each end of both cylinders about half an inch, and brought outwards, the end of the tape being prevented slipping through by the knot; the tapes were then placed in such a situation as to be intermediate to the ligatures; this being done, I turned the cylinders gently towards the edge of the wound, and tied the corresponding tapes over it, which, I think, rendered it much more solid that the vertical incisions for the flaps be first made, as the relaxation of the tension of the parts affects much the state of the flap when the transverse cut is first made, and thus interferes with the plan of the operation.[1]]

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[1] Merriman's Synopsis, p. 110.

[2] Ed. Med. and Surg. Journal, vol. xix. p. 552.

[3] Cooper's Surgical Dict. p. 1209.

[4] Capuron, Mal. des Femmes, p. 489.

[5] Lancet, March 3d, 1838.

[6] Gazette des Hôpitaux, 22 Jan., 1853, p. 88.

[7] Ranking's Abst., vol. xxi. p. 200.

[8] Ibid., p. 201.

[9] Lancet, May 4th, 1839.

The diet should be spare: a little gruel and biscuit will answer very well. Of course, absolute rest is necessary.

"If the radical cure fail," Dr. Burns observes, "the patient must use a compress, with a spring bandage, if the stools cannot be retained. But it sometimes happens that the torn extremity of the rectum, or the anterior parts, containing a fragment of the sphincter, or a portion of the internal sphincter, as it has been called, forms a kind of flat valve, which rests on the posterior surface of the coccyx, so that the orifice now resembles a slit, and the fæces, unless very liquid, remain in the hollow of the sacrum, and do not pass through the vulvular orifice till an effort be made to expel. Sometimes the perineum unites, but the septum does not, and the inner surface of the rectum protrudes into the vagina. In these cases the edges of the septum must be made raw, and stitches used."

In a case which I had the opportunity of seeing through the kindness of Dr. Beatty, not only had the sphincter been torn through, but the laceration extended nearly two inches up the recto-vaginal septum. Dr. Beatty first pared the edges of this laceration *down to* the sphincter, and inserting four wire sutures, fixed them with the button shield, which was removed on the eighth day, and the union found to be complete. After an interval of six weeks the edges of the torn sphincter were removed, and three or four wire sutures inserted and tightened by twisting. A rectum bougie was kept constantly in the orifice, and the bowels were constipated for a week each time. After eight days the ligatures were removed, and the cure found to be perfect. The patient has now perfect command over the sphincters.

CHAPTER XXIII.

PARTURITION.—CLASS III. COMPLEX LABOR.

ORDER 6. INVERSION OF THE UTERUS.

756. This is a very rare complication, but a very distressing and dangerous one. It is neither more nor less than a turning of the uterus inside out. The fundus descends through the os uteri, forming a cavity lined by the peritoneum, open towards the abdomen, and containing the ovaries and fallopian tubes, whilst that which was formerly the lining membrane of the uterine cavity, has become the external covering of the tumor.

The degree of inversion may vary: it may be *partial* or *complete*. Mr. Newnham, who has published a valuable monograph on this subject, has spoken of three degrees—*depression*, *partial*, and *complete* inversion. With regard to the first, he observes: "The fundus of the uterus is depressed within its cavity, but does not form a tumor in the vagina. The actual existence of this stage of the disease can only be known by introducing the finger into the uterus, and by ascertaining the state of that organ by pressure upon the abdomen. By the *former process*, the fundus of the womb will be found to have approached the os internum, and by the latter a corresponding depression will be observed, instead of that regular contraction which is so familiar to every prudent practitioner. This state is generally accompanied with an effort to bear down, by which it is often converted into *partial* or *even complete* inversion." Of course, so slight a change in the uterus is only perceptible through the parietes of the abdomen when the patient has been recently delivered. In the unimpregnated uterus, such an examination would yield no information. "When the inversion is *partial*," continues Mr. Newnham, "the fundus of the uterus is brought down into the vagina, forming a tumor of considerable size, presenting a semi-spherical form, and closely invested by the os uteri. In this case the depression of the fundus, observed through the parietes of the abdomen, will be considerably greater than in the former, "and the edge of the cavity thus formed will alone be felt. In the *complete* inversion, the uterus will be found not only filling the vagina, but protruding beyond it, resembling in its form that of the uterus after recent delivery, only that its mouth is turned towards the abdomen. The os uteri may be felt at the superior extremity of the tumor, forming a kind of circular thickening at its apex, and the uterus is wholly wanting in the hypogastric region. This state is usually accompanied with inversion of the vagina."[1]

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[1] [Amer. Journ. of the Med. Sciences, Oct. 1850.]

757. Inversion may occur under very different circumstances; as for example: 1. *Immediately after delivery*, as the result of a peculiar condition of the uterine fibres, of too quick delivery,[2] etc. Dr. Skae has recorded one which occurred after an abortion at four months, and which was reduced twelve hours afterwards.[3] 2. *A few days after parturition*, though Newnham conceives that in these cases *depression* of the fundus existed from the first. 3. Or *very gradually*, in consequence of a polypus attached to the fundus, the uterus not being pregnant. Astruc, Capuron, and Newnham doubt the existence of such cases; but several are on record,[4] and I witnessed one myself, of the nature of which no doubt could be entertained.[5] We may be deceived, however, and suppose an inversion to have occurred gradually, because it has remained long undiscovered. Levret mentions a case occurring after delivery, which was not detected for five years.

By almost all authors, inversion has been divided into *acute* and *chronic*; not, however, confining the term chronic to cases where the production of the inversion has been slow, but including all those where it has existed for some time. The division appears to me to be useful and practical, though perhaps not conveying as much information as the terms "*reducible*" and "*irreducible*," which Dr. Radford, of Manchester, has proposed as the substitute.

758. CAUSES.—Various causes are enumerated by authors, some of which are real, and some only fanciful. Most of them, however, are such as would act merely mechanically. It has been observed to follow very quick labors, especially if the patient be delivered standing, or if she make too violent efforts. It may occur spontaneously,[6] after the labor has been completed quite naturally, and in these cases it has been attributed by Dr. Radford to atony of the uterus, or to active contraction of one part, with an atonic condition of another. Dr. Tyler Smith regards inversion as depending upon an irregularly active condition of the uterus, by which the fundus is first de-

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[1] An Essay on the Symptoms, Causes, and Treatment of Inversio Uteri, p. 2.

[2] Williams, Lancet, July 27th, 1839. [3] Edin. Monthly Journal, May, 1849, p. 773.

[4] Jourdan, Dict. de Méd., vol. xxiii. p. 289.

[5] Dublin Journal of Med. Sciences, Sept., Nov., 1837.

[6] Waller's Ed. of Denman, p. 244, note.

pressed, then carried downward by the annular contraction of the uterus, and, finally, *completely* everted. Nauche considers the inactive state of the uterus, and some effort made by the patient, or by an attendant pulling the cord, as the principal causes.[1] Capuron enumerates, as *predisposing* causes, the development of the womb, the dilatation of its orifice, and the atony or flaccidity of its walls. The *exciting* causes may be the weight of the fundus, violent expulsive efforts, tractions by the funis, and the dragging downwards by a polypus.[2] Henkel attributes this accident to violent after-pains; Meissner to a bodily predisposition, owing to a laxity of fibre. Siebold says, that atony of the uterus, with a large pelvis, and the too rapid abstraction of the contents of the uterus, may expose the patient to inversion.[3] Boivin and Dugès enumerate, among the principal causes of inversion, a flaccid, distensible state of the uterine parietes; inertia of the uterus, especially if, at the same time, an effort be made for the extraction of the placenta; irregular uterine contraction, too prominent sacral promontory, dragging at the cord, and uterine polypus.[4]

It is very credible, that violence in extracting the placenta may be followed by inversion;[5] or, as Denman observes, "there is reason to believe that the uterus has been inverted, when, on account of a hemorrhage, or some other urgent symptom, the hand has been introduced within the cavity of the uterus while in a collapsed or wholly uncontracted state, and the placenta being withdrawn before it was perfectly loosened, the fundus of the uterus has unexpectedly followed, and a complete inversion has been occasioned.[6] Forcibly pulling the funis, for the purpose of detaching the placenta, may, perhaps, under certain circumstances, give rise to this accident, but it is not a frequent cause. Shortness of the funis, or the shortening of it by coiling around the neck of the fœtus, has also been alleged, but, I believe, without any foundation. Cords of ten inches long will permit, and have permitted, the exit of the fœtus without displacing the womb, and it is very rare indeed to find the funis so short. As to the shortening of the cord when it is twisted around the neck, this can never be the cause of inversion, since it rarely occurs but when the cord is longer than usual, and it very seldom reduces the length of the cord below twelve inches.

But inversion may occur quite unconnected with parturition, as I have already stated. If a tumor form at the upper part of the fundus uteri, it will first distend the uterus mechanically, and then, by its weight, it may descend through the os uteri, dragging the fundus after it, and so produce complete inversion. Such a case I saw in Jervis-street Hospital, under the care of Surgeon Lynch. Cases of this kind are also related by Dr. Browne,[7] M. Leblanc,[8] Dr. Oldham, and one, more recently, by Dr. Higgins, who successfully removed both the uterus and the tumor with the knife, having previously tied a tape around the upper portion as a precaution against hemorrhage. The patient bore the operation well, and recovered perfectly.[9]

759. SYMPTOMS. — We shall first examine the symptoms which arise in *acute* inversion, *i. e.*, when it occurs soon after delivery, and when the displacement is nearly or quite *complete*. These are always serious and alarming, indicating the important nature of the accident. The most universal symptom is a sudden exhaustion or sinking, which comes on immediately after the inversion. It does not depend upon flooding, for it occurs in many cases where there is no hemorrhage. The countenance becomes deadly pale, the voice weak, the pulse rapid, small, and fluttering, nausea and vomitings

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[1] Mal. Prop. aux Femmes, vol. i. p. 181.
[2] Mal. des. Femmes, p. 495.
[3] Handbuch der Frauenzimmerkrankheiten, vol. iii., p. 365.
[4] Diseases of the Uterus, p. 137.
[5] Manning on Female Diseases, p. 285.
[6] Midwifery, p. 421.
[7] Dublin Med. Journal, vol. vi. p. 83.
[8] Mem. de l'Acad. de Chir., vol. iii. p. 379.
[9] Ed. Monthly Jour. July, 1849, p. 889.

occur, etc., so that the patient is suddenly threatened with the extinction of life.[1] Several authors speak of more decidedly nervous symptoms, and even of convulsions,[2] but by some, at least, the restlessness and agitation preceding dissolution, appear to have been mistaken for convulsions. When the inversion is slighter in degree, these phenomena will generally be found less strikingly marked. Hemorrhage, even to a very large amount, not unfrequently occurs, aggravating, though not changing, the symptoms already enumerated, and materially enhancing the danger of the patient. Mr. Newnham observes, "When the uterus has become inverted, immediate hemorrhage takes place, which is quickly followed by faintness and a sense of fulness in the vagina, and in the greater number of instances, almost by immediate dissolution."[3]

Our suspicions of inversion will be excited when this persists longer than usual, and an examination should instantly be made to ascertain the cause, if possible. In many cases, however, there is no hemorrhage at all, or not in proportion to the inversion, but merely the nervous symptoms and exhaustion; nor does the difficulty of rallying the patient seem to be less in these cases than in those accompanied by flooding.

There is generally a very violent uterine contraction immediately preceding or accompanying the inversion, leading the patient to anticipate a second child; this supposition is further confirmed by the pressure of the inverted uterus as it passes through the pelvis. Even on an examination *per vaginam* we may be deceived, by mistaking the uterus for the breech of a second child. The patient complains of great pain, with a sense of dragging from the loins, and occasional retention of urine. If pressure be made on the abdomen, we shall not be able to feel the contracted uterus, and this being at a time when it is large, constitutes a marked and valuable symptom.[4] When the inversion is incomplete, we may sometimes feel the uterus above the brim of the pelvis, but having a cup-like depression superiorly.

If we examine *per vaginam*, we shall find a tumor either in the cavity of the pelvis or hanging through the vulva. This tumor is globular, sensible, elastic, with a rough and bleeding surface, wider below than above, where it is tightly encircled by the cervix uteri. If the displacement be not reducible, it sometimes happens that the tumor is attacked by inflammation, running on into sloughing and gangrene, owing to the strangulation caused by the contraction of the cervix, and ending in the death of the patient. If the placenta have not been previously expelled, it will be found adherent to some part of the tumor, adding greatly to its bulk. A considerable difference in the size of the tumor will be observed according as the inversion is *complete* or *incomplete*, recent or of old standing. If quite *complete*, we may acquire further information from a visual examination. The tumor is of a red color when the inversion is recent, but gradually becomes of a dull brown.[5] If *incomplete*, we shall still be able to detect it in the vagina, though, if there be *depression* merely, we may not be able to reach it.

760. The foregoing are the most prominent symptoms of *acute* inversion; those which characterize the *chronic* stage of the disease, whether that stage be the issue of an *acute* attack or the result of a gradual displacement, are, of course, much less formidable. The patient is subject to occasional hemorrhages, and to a constant and profuse mucous discharge during the intervals.[6] Every month the surface is observed to be covered with red drops, which are in fact the menses.[7] The patient complains of pain, a sensation of weight in the pelvis, and dragging from the loins. If the uterus protrude through

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[1] Duncan's Annals of Med., 1800, p. 390.
[2] Burns's Midwifery, p. 518.
[3] Essay on Inversion, p. 86.
[4] Denman's Midwifery, p. 420.
[5] Boivin and Dugès, Dis. of Uterus, etc., p. 114.
[6] Gardien, Traité des Acc., vol. iii. p. 325.
[7] Clarke, Dis. of Females, vol. i. p. 164.

the external parts, its sensibility will gradually diminish, in consequence of the formation of a kind of epithelium upon its surface; and if it be exposed to rude contact, or if acrid secretions be allowed to accumulate upon it, circumscribed inflammation may occur, followed by ulcerations, either superficial or profound, and involving some danger to the patient, if not remedied.

The constitution of the patient sympathizes deeply with so extraordinary an accident. After recovery from the state of exhaustion or nervous depression into which she was first thrown, the repeated hemorrhages and constant leucorrhœa will render her countenance pale and exsanguined, and subject her to various secondary symptoms, such as syncope, dropsical effusions, hectic, etc.

761. TERMINATIONS.—The patient may die from exhaustion or from hemorrhage soon after the accident, according to Heister,[1] Peu,[2] Levret, Giffard, Windsor, Clarke, Denman,[3] Boivin, and Dugès; or from the more distant consequences of the repeated hemorrhages, as related by Mauriceau,[4] Haighton, Cooper, Windsor. Fatal cases are also related by Peu, Portal,[5] Vanderweid, and Millot, Chapman,[6] Saviard,[7] Heister,[8] Smellie,[9] and Mauriceau. Boivin and Dugès add, that "death following a very few days after the inversion, may have been occasioned by pains, convulsions, and syncope, caused even by the violence which the uterus has undergone."

Distension and inflammation of the bladder may occur, involving considerable danger.[10] The inverted uterus may be strangulated, and be separated by sloughing or gangrene with great danger, although cases are on record where this termination issued favorably.[11] Or, if the patient do not sink from the primary shock, and if no destructive process take place in the tumour, it will, after a while, shrink very much in size, and the patient may suffer comparatively very little annoyance. Denman mentions the case of a patient who consulted him for an inverted uterus twenty years before her death; and Lamotte another, "in which the inversion was complete thirty years before." Very rarely the detruded organ has become the seat of malignant disorganization, either cancer or corroding ulcer.

762. DIAGNOSIS.—The facility of the diagnosis will depend very much upon the extent of the inversion; when incomplete, it is very difficult, and even when complete it will often require great care. It is less obscure if the examination be made soon after the accident.

1. If *incomplete*, it may be mistaken for *polypus uteri*, but it will be distinguished by its bleeding and rough surface, by its insensibility, and by the "*cul de sac*" within the os uteri. In a case published by Dr. M'Clintock,[12] the diagnosis was by no means so easy. The tumour was not large, nor peculiarly sensible, nor had it a rough surface; moreover, there was something like a neck to it, and a well-marked os uteri surrounding it. The finger alone could not have distinguished it from polypus, but at no part could a bougie be passed into the uterine cavity, and when the tumour was drawn down, all appearance of cervix and os uteri was obliterated.

2. If *complete*, it will resemble *prolapse of the uterus*, but may be distinguished by the period of its occurrence, by the flooding, by the absence of the smooth vaginal covering of the bladder anteriorly, and of the os uteri inferiorly.

3. It may be distinguished from *prolapse of the vagina* by its hardness, its rough, flocculent, and bleeding surface, and by its unvarying size.

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[1] Surgery, vol. ii. p. 559.

[2] Prat. des Accouch., p. 585.

[3] Midwifery, p. 422.

[4] Traité des Accouch., vol. ii. p. 294.

[5] Obs. 76.

[6] Midwifery, Case 29.

[7] Obs. 15, 36.

[8] Obs., Case 369.

[9] Midwifery, Case iii., p. 444.

[10] Burns's Midwifery, p. 519.

[11] Ryan's Journal, March 12th, 1836.

[12] Dublin Quarterly Journal, Feb. 1859.

The value of some of these characteristics, such as the hemorrhage, the state of the cervix, and the size of the tumor, is limited to a short period after the accident, and to those cases which occur after delivery.

763. TREATMENT.—1. Of *acute* inversion. Our first object is unquestionably to reduce the displaced organ; and if we are on the spot when the accident occurs, it is in general not very difficult. It is of the last importance that the reduction be attempted instantly. Every hour increases the difficulty, and the lapse of four or five, according to Denman,[1] may render it impossible. The period when the inversion becomes irreducible, will be found to vary somewhat in different cases, and according to the experience of different practitioners. There is also a great difference, according as the inversion is complete or incomplete. It has been stated to have been reduced spontaneously, when the fundus uteri was merely depressed,[2] and even when the displacement was complete.

But no anticipation of such an occurrence will justify our losing a moment in attempting to re-invert the uterus. The protruded organ should be grasped firmly and passed in through the vaginal orifice, followed by the hand (previously well oiled,) which, when in the vagina, should be closed and formed into a cone, and made to press mainly upon the fundus uteri. No effect will be produced upon the inversion until the vagina shall have been put upon the stretch; but then, after some time, it will be found to recede, and on being still further pressed, it suddenly starts from the hand (like a bottle of india-rubber when turned inside out), and the organ is restored to its natural condition. The hand, now in the cavity of the uterus, is not to be withdrawn, but rather allowed to be expelled by the uterine contraction. This will insure the patient against a repetition of the accident. We should also assure ourselves, before the removal of the hand, that the restoration has been complete. I need not say that (unless counter-indicated) the operation will be more easily performed under chloroform.

Mr. Newnham advises that we should endeavor to "return first that portion of the uterus which was last expelled from the os uteri." It will be found very difficult to attend to this minutely, when the hand with the uterus is in the cavity of the pelvis, for want of room; and whilst the tumor is external, the re-inversion does not take place; it is expressly stated by several authorities, that they did not feel the reduction properly commence until the vagina was stretched to its full extent.

764. In many cases the placenta remains attached to the womb at the period of inversion, and different opinions have been held as to the propriety of removing it before reducing the displacement. Baudelocque, Gardien, Capuron, Boivin and Dugès, Radford, and others, recommend its prior removal; but Denman, Clarke, Burns, Carus, Newnham, Blundell, Gooch, etc., as decidedly oppose it. Mr. Newnham remarks, "It has been recommended by several respectable authorities to remove first the placenta, in order to diminish the bulk of the inverted fundus, and thus facilitate the reduction. But it is surely impossible that this proceeding can be attended with any beneficial consequences, whilst the irritation of the uterus would necessarily tend to bring on those bearing-down efforts which would present a material obstacle to its reduction, and would increase the hemorrhage at a period when every ounce of blood is of infinite importance." "Besides, returning the placenta while it remains attached to the uterus, and its subsequent *judicious* treatment as a simply retained placenta, will have a good effect in bringing on that regular and natural uterine contraction which is the hope of the practitioner and the safety of the patient." It may be doubted, I think, whether the removal of the placenta is attended with so

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[1] Midwifery, p. 420.

[2] Capuron, Mal. des Femmes, pp. 504, 509.

much danger; for in many instances it has been found impossible to reduce the uterus in consequence of the great addition to its bulk which the adhesion of the placenta occasions; and in such cases there is no hesitation about the propriety of removing the placenta, nor have I met with any evil effects recorded as the result of so doing. I have no doubt, therefore, that as removing the placenta would facilitate the reduction of the inversion by lessening its volume, that the proper method in general would be to peel it off before attempting to restore the organ.

765. When the tumor is in danger of strangulation from the circular band of the fibres of the cervix uteri, or in case such band should seriously impede the reduction, it has been recommended to divide it with a bistoury. Of course the bladder and rectum should be emptied previous to returning the uterus, unless we are present at the moment the accident occurs; at that time, the operation occupies so short a time, that catheterism may be deferred until afterwards, and constipation for twenty-four hours will rather be an advantage. If the inverted uterus and the neighboring parts should be much swollen, or if the patient be feverish, it may be necessary to take away some blood and foment the parts before attempting the reduction.

766. But should the disease be of some days' standing, are we to look upon the reduction as hopeless? Certainly not. There are cases on record of the attempt having been successful after days and weeks have elapsed, and the condition of the patient is so distressing that no means, however apparently unlikely, should be left untried. In Loffler's case, 6 or 7 hours had elapsed; 17 in Mr. White's case; 24 in Mr. Winter's; 28 in Mr. Dickenson's; 3 days in Mr. Cawley's; 7 in Dr. Radford's (case 6); 8 in MM. Chopart's and Anè's; 8 in Mr. Ingleby's; 10 or 12 in M. Lauverjat's; 13 in M. Hoin's; and 12 weeks in Dr. Belcombe's. Recently Mr. Canney[1] reduced one of 5 months' standing; and M. Barrier,[2] one of 15 months, both under chloroform; and I have no doubt that this agent will be found of great value in facilitating the operation. Plenck advises dilatation of the os uteri before attempting the reduction, and perhaps in some cases this may be possible.

If we succeed in restoring the womb to its natural state and situation, great care will be requisite to avoid a recurrence of the accident, or, what is more likely, a prolapse of the uterus. The patient should remain longer than usual in the horizontal position, with the head low, the pelvis elevated, and the knees bent. A dose of opium will be found very useful, and, if there be much exhaustion, it must be repeated, and stimulants in proper quantity be given. A pessary has been advised, in order to maintain the uterus in its place, but this will very rarely be necessary. When the lochial discharge has entirely ceased, it may be beneficial to use some astringent injections into the vagina once or twice a day, especially if leucorrhœa be present.

767. If the inversion be *irreducible*, we must then consider how far it may be advisable to content ourselves with palliative remedies, such as returning the tumor into the vagina to protect it from injury, and supporting it either by a bandage and compress, as recommended by Dr. Hamilton for prolapsus uteri, or by a pessary.

Should this plan not be practicable, or fail of success, it may then be a question as to the propriety of extirpation. There is abundant evidence to prove that life may be preserved after the loss of the womb. Rousset relates a case where the uterus was destroyed by gangrene, and the patient recovered; and Rousset, Primrose, Radford, and Cooke, have given cases in which the uterus appears to have sloughed off, without compromising the patient's life. This being the case, there is every encouragement, within certain limits, to effect that removal by art which nature thus so beneficially accomplished.

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[1] Med. Times and Gazette, Sept. 18th, 1852, p. 286.

[2] Ibid., Sept. 4th, 1852, p. 231, from Archives Gén., Mai, 1852.

In this opinion Sir C. Clarke fully coincides: he observes, "In those cases of inversion of the uterus where the woman has *passed the menstruating age*, when her comfort is destroyed by the disease, and when the profuseness of the discharge threatens her with death, from the debility which it produces, it may be advisable to recommend the performance of an operation which has been attended with success, viz., the removal of the inverted uterus itself." "How far it may be right to resort to this operation *during the menstruating part* of a woman's life, the author has no means of judging."[1] The operation, however, has been performed during the "menstruating part of a woman's life," with complete success. We may therefore conclude that the operation is perfectly justifiable, provided 1st, that the patient is in a fit state of health for an operation; and 2dly, that the uterus be not affected with scirrhus or cancer.

The operation has been successfully performed by Ambrose Paré, Petit, Carpi, Sclevogt, Vater, Laumonier, Bouchet, Boudol, Dessault, Hunter of Dumbarton, Chevalier, Johnson, Hamilton, Clarke of Dublin, Newnham, Windsor,[2] Davis, Hull, Blundell,[3] Moss,[4] Lassere,[5] Williams,[6] Higgins,[7] Geddings, Teale, M'Clintock, etc. Other cases less fortunate are on record.

The operation consists in applying a ligature of silk, whipcord, fishing line, or silver wire, around the tumor at its highest part, and gradually tightening it, as the patient may be able to bear it, until the tumor is entirely separated. Or a double ligature may be passed through the centre of the neck of the tumor, and each half included in a separate ligature. Or, as was successfully done by Dr. Geddings,[8] and Mr. Teale,[9] we may prefer, after tightening the ligature to a certain degree, to remove the tumor immediately by cutting below the ligature, or what is simpler, and I think safer, the tumor being drawn down may be removed by the *écraseur*, as was done by Dr. M'Clintock. We must take care to include only the uterus and not to wound the peritoneum. Before doing this, it will be necessary to satisfy ourselves of the adequacy of the ligature to restrain any hemorrhage.

The symptoms which arise after the application of the ligature are just such as we might expect from the strangulation of so important a viscus. The patient suffers from nausea, vomiting and pain, which greatly diminish in the more favorable cases, but which are the prelude to peritonitis in the fatal ones. When these symptoms are violent, it will be necessary to loosen the ligature, and wait some hours before again tightening it. A full dose of opium should also be given, and the bowels kept free by enemata. The strength of the patient should be maintained by a nutritious, though not stimulating diet.

[Extirpation of the uterus, when it is the seat of no malignant disease, is a terrible operation, and, even under the circumstances mentioned in the text, of doubtful propriety. Not only have some women lived many years afflicted with inversion, but in several instances without any great pain or suffering in their general health. In some cases, too, the uterus has returned spontaneously, after the lapse of considerable time, to its natural condition, and the individuals have conceived and borne children. Several very instructive cases of the kind are related by Professor Meigs, in his edition of Colombat, two of which occurred under his own notice.]

If the inversion be caused by or complicated with polypus, it may be necessary to remove both, and the polypus should be excised before applying the ligature to the uterus.

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[1] Diseases of Females, vol. i. p. 149.

[2] Med.-Chir. Trans., vol. x. p. 858.

[3] Diseases of Women, p. 144.

[4] Brit. and Foreign Med. Rev., April, 1837, p. 561.

[5] Encyclograph. des Sciences Méd., vol. xxxvi. p. 179.

[6] Lancet, July 27th, 1889.

[7] Ed. Monthly Journal, July, 1849.

[8] Charleston Med. Journal. Ranking, vol. xx. p. 201.

[9] Med. Times and Gazette, Sept. 1, 1855.

CHAPTER XXIV.

SUDDEN DEATH.

768. I do not know whether, strictly speaking, I ought to include among complex labors that appalling occurrence which many, perhaps most men of much experience, have witnessed at least once in their lives, of a patient whose delivery has been natural, and whose condition such as to excite no alarm, suddenly, and without apparent cause, dying. A more fearful accident can hardly be conceived, aggravated as it is by the contrast of a few hours before, and by the wholly unexpected nature of the event.

But though such cases do occur, and are now and then registered in the journals, comparatively little attention has been bestowed upon the subject until of late. Dr. Ramsbotham, sen., published a paper on the subject, which was afterwards incorporated in his Practical Observations;[1] and the subject is noticed by Mr. Travers,[2] and Dr. Meigs.[3] Very lately, Dr. Cormack[4] has written upon the subject; and more recently it has occupied the attention of the French Acadamy of Medicine. But by far the most complete investigation is an essay by my friend Dr. M'Clintock,[5] who has very kindly given me permission to make free use of the cases he has collected and published therein.

At present it is quite impossible to give a complete and satisfactory history of the subject; probably the best plan I can adopt is to lay the cases before the reader, classifying them so far as I am able, with such practical deductions and suggestions as they may warrant. In this, I do but follow Dr. M'Clintock's arrangement, adding a few cases from my own experience, and some from various sources which may have escaped him.

769. I. *Syncope.*—It appears beyond question that many of these cases are examples of fatal syncope, though we are not able to trace its cause in each case. For example, Dr. Merriman relates the following instance:—"An accoucheur was once attending a young woman in labor of her first child. Soon after it commenced, and during his absence, she fainted, without any obvious cause. On his return the circumstance was mentioned, but as by this time she appeared perfectly recovered, no further notice was taken of it, and she was safely delivered without any unusual symptoms. On the third day after the delivery she took a dose of aperient medicine, and while in the act of relieving herself, fell back and immediately expired."

One of the three cases mentioned by Dr. Denman certainly comes under this head. He relates it as follows: "Another raised herself in bed to take nourishment about half an hour after delivery. She fell back and died immediately. She was opened by the celebrated Dr. Jenner. There was no effusion of blood in the brain or in any other part; but the heart was found flaccid, perhaps somewhat enlarged, and not a drop of blood in either auricles or ventricles."[6] The second case was that of "a woman in labor who was put to bed, and made an effort to change her situation; she died instantly in the act of moving, but she had previously complained of a piercing pain in her head and loss of sight." Another was in such a situation, that the child was expected to be born the next pain; she threw herself back and died instantly. The two last cases are the only ones I have found in which death took place before delivery. I do not think they died of apoplexy, but whether of fainting or asphyxia I cannot decide.

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[1] Page 116, 2d Ed.

[2] Inquiry into Constitutional Irritation, p. 48.

[3] Woman and her Diseases, p. 557.

[4] London Journal of Medicine, vol. ii. p. 941.

[5] Med. Press, Dublin, March 10th and May 5th, 1852.

[6] Introduction to Midwifery, p. 427.

The account given by the Rev. Dr. Buchanan of the death of his wife, is a very graphic picture of fatal syncope occurring about the fourteenth day, and is the more interesting as the description of a non-medical person.[1] Dr. Simpson mentioned a case to the Edinburgh Obstetrical Society, which appears to me to come under this division. "A patient attended by one of the pupils of the hospital, rose up and stood for the first time, about a week after delivery. She immediately fainted and expired."[2] The Nashville Journal of Medicine and Surgery[3] gives two cases of collapse after parturition, which proved fatal, related by C. R. Winston, M.D., of Nashville, Tennessee.

Of a similar kind appear the cases related by MM. Robert, Danyau, etc. In M. Robert's case, the patient, aged twenty-five, who was much excited by political occurrences, was delivered of her third child. All went on well until the ninth day, when being assisted from her bed, she suddenly sank down and expired.[4] M. Robert has met with two other cases: one was a primipara, the other had borne several children, and both died on the sixteenth day. A *post-mortem* examination threw no light upon either of these three cases. M. Danyau mentioned that MM. Dubois, Moreau, Baudelocque, and himself, had each seen similar cases. In his case the labor was easy and the recovery excellent; he visited her on the twentieth day, and found her agitated and perplexed; in a short time afterwards she passed into an adjoining chamber, and there died. At the autopsy no air was found in the veins or heart; the only pathological change worthy of note was a vascularity of the pericardium, and slight effusion into its cavity.

Dr. Chisholm has related a case of arm presentation, in which he turned and delivered with no more difficulty or hemorrhage than usual, on Jan. 12th, 1854. She went on well until the 19th, when he was suddenly sent for, and found her dead. "The account given by her friends was, that while sitting up in bed, after having taken her breakfast as usual, she was seized with a pain in her back which made her scream out: shortly afterwards, she fell back fainting; and having made a very imperfect rally from this, soon fainted again and expired." A *post-mortem* examination threw no light upon the cause of death. There were no signs of asphyxia in the lungs, and no traces of disease anywhere; but the heart was rather softer and paler than usual, and uncontracted, with clots in all its cavities.[5]

Early in the year 1852, I was requested by a medical friend to see with him a patient who had miscarried a few hours before, with very little pain and no hemorrhage. On visiting her half an hour previously he had found her fainting, without any ascertainable cause. Although we were not five minutes on our way, she was dead before we arrived. No *post-mortem* examination could be obtained, and yet I think that we cannot hesitate to regard this as another example of fatal syncope, and not death from organic disease, for up to the previous day she had been in perfect health. Some time ago, I attended a lady in a miscarriage, who had not more than the usual amount of loss, after which she felt very faint, but recovered. She went on quite well for several days, when suddenly one evening I was sent for, as she thought herself dying. I found that she had become very faint, without any apparent cause, and notwithstanding every means that we could try she gradually sank, and died in a few hours, with no other symptom than faintness. She had suffered a good deal from morning sickness, but otherwise had been a stout healthy woman. I was refused permission to make an examination. Although the death in this case was less sudden, I can only suppose it to have occurred from syncope.

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[1] Memoirs of Rev. Dr. Buchanan, p. 378.

[2] Ed. Monthly Journal, 1849, p. 767.

[3] L'Union Médicale, 10 Jan., 1852.

[4] Feb., 1851.

[5] Edin. Monthly Journal, Sept., 1854, p. 348.

But what is the condition which gives rise to this fatal syncope? We know little or nothing. It does not depend upon hemorrhage, nor the shock of labor, nor fear; for the distance of time from the labor, in many cases, shows that from such effects, if they existed, the patient must have recovered. They appear, in fact, to be cases of cardiac paralysis. Unfortunately, in most of the cases the unexpected suddenness of the event deprives us of the opportunity of treatment; but knowing the possibility of such an accident, may put us on our guard, and lead us to be very cautious in permitting the patient to sit up or to make exertion if she be unusually delicate, or if anything in the labor or convalescence excite our fears.

770. II. Another cause of sudden death is what has been called, "*idiopathic asphyxia,*" which, Dr. Christison observes, "causes death almost instantaneously, or in a few minutes, or sometimes not for an hour and a half. The symptoms are those of fainting merely, and the only appearance in the dead body is flaccidity of the heart, with an unusual or total want of blood in its cavities."

M. Chevallier, who was, I believe, the first to describe this form of sudden death, gives us an example of it: the case of a woman who died shortly after having been delivered of twins. After the birth of the second child she appeared a good deal exhausted, and as the discharge of blood was very moderate, the accoucheur thought it best to defer the extraction of the placenta. She recovered a little, but about two hours afterwards grew suddenly faint, breathed short, and died in about half an hour." "All the viscera were free from disease. The uterus contained the placenta, with a small quantity of blood; but all the cavities of the heart were in a state of relaxation, and completely destitute of blood. There was no blood in the vena cava near the heart, and the emptiness of its ascending branch extended as low as the iliac veins."[1] He quotes also a similar case from Morgagni,[2] in which the patient died before the expulsion of the placenta, and the heart was flaccid and nearly empty. Without attempting to explain the production of such a disease, and attributing it to some loss of power, first in the minute vessels, and afterwards in the larger ones, and the heart, M. Chevallier contents himself with recommending the horizontal position, the employment of stimulants, brisk friction, warmth, in some cases a hot bath, stimulating enemata, etc.

I am at a loss whether to place Dr. Ramsbotham's cases (43, 44, 45)[3] under this head or the former. The fatal attack took place soon after delivery, without hemorrhage or any apparent cause, but the death was not so sudden as in the former class—in one case about two hours after delivery, in another about three, and in a third two days after. That eminent author thus graphically describes the symptoms,[4] "Shortly after the birth of the child, and the removal of the placenta, when the woman has previously appeared to be doing well, she complains of unusual faintness; says she is extremely ill; at the same time she is unable to describe what is the matter with her. If inquiry be made into the state of the uterus, that viscus is found to be tolerably well contracted; if inquiry be also made as to the quantity of blood escaping externally, that is not unusually large. The woman complains of no pain about the belly; there is no mark of derangement; notwithstanding, she presently gets worse; the pulse begins to flag; the countenance assumes a pallid, cadaverous aspect; she becomes extremely restless, and ceases to express her feelings except by a moan. By [illegible] she is seized with a violent pain, or rather stricture, across the chest, and soon ceases to breathe, to the astonishment and grief of all around her."

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[1] Medico-Chir. Trans., vol. i. p. 160.

[2] Epistola xlvii. [illegible]

[3] Pract. Observations, 2d Ed., p. 118.

[4] Ibid., p. 1[illegible]

Dr. M'Clintock mentions two cases related to him by Mr. Barker, of this city. "In each of these cases, death took place quite suddenly and unexpectedly, not many days after delivery." "As may be supposed, Mr. B. submitted the bodies of these women to a very extensive and close scrutiny; but he failed in discovering anything to account for death, except an unusual flaccidity of the heart, with complete absence of blood in its cavities. We may fairly conclude with him, therefore, that dissolution was the result of idiopathic asphyxia, or of some cognate syncopal affection."[1] Professor Beatty has recorded a case of a healthy woman, æt. 40, in the ninth month of pregnancy, who complained of weakness and sick stomach, and immediately afterwards fell back dead. He examined the body most carefully, and the appearance led to the conclusion that the cause of death was idiopathic asphyxia.

But what relation does this idiopathic asphyxia bear to the former cause of death—I mean fatal syncope? Are they essentially different, or merely varieties of the same condition? Dr. Samuel Wright seems to regard them as pretty much the same, both consisting of a sudden paralysis of the heart.[2] The *post-mortem* appearances mentioned by M. Chevallier are nearly identical with those given by others of mortal syncope, and the symptoms only differ in the rapidity of their course. It is possible that in the one case the paralysis may commence in, or be limited to, the heart, and in the other to the lungs, but it is very difficult to speak decidedly on the subject.[3] And certainly, as Dr. M'Clintock observes, "if we look upon the idiopathic asphyxia of M. Chevallier as nothing more than a variety or form of syncope, the liability of its invading a woman in childbed becomes still more apparent, from the state in which her constitution is left by the act of parturition; a state of which the prominent characteristics are, an unusual proclivity to diseased action, an excited condition of the vascular, and a morbid sensibility of the nervous, system. The shock of labor is not recovered from for many days, and during this period (the length of which necessarily varies under different circumstances) the *vis vitæ* is minus; hence any impression of a severe kind, whether affecting mind or body, is not met by the same vital resistance as at other times."

But the difference in degree, the more gradual progress towards death, is an advantage so far, that it gives time for the employment of remedies, and Dr. Ramsbotham observes, that when the patient has been kept up, and after-pains have recurred, she has recovered. The ocurrence of the after-pains, I take it, are rather an effect than a cause of the improvement.

Prompt administration of stimulants, aspersion with cold water, a current of air, warmth to the feet, perhaps galvanism, and especial attention to the uterus, so as to prevent any loss of blood, are the chief means at our command, and which ought to be continued in as long as there is the least hope.

771. III. The *shock to the nervous system* of a prolonged and severe labor may sometimes prove fatal, without hemorrhage or organic injury, and this especially when the mind has been anxious or depressed previously. Mr. Travers observes, that "pain, when amounting to a certain degree of intensity and duration, is of itself destructive. Difficult and protracted parturition is every now and then fatal from this cause; and even in cases in which neither extraordinary difficulty nor protraction was experienced, a fatal prostration has sometimes supervened, which has admitted of no other explanation. The delivery has been complete, without any degree of physical

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[1] Med. Press, March 10th, 1852, p. 146.

[2] Path. Researches on Death from Suffocation and from Syncope, etc., p. 14.

[3] Med. Press, March 10th, 1852, p. 146.

injury, and not more than an ordinary quantity of blood has escaped from the vessels of the uterus; yet the woman, in spite of the encourgement derived from the consciousness of safety to herself and infant, and of comfort from the conclusion that her sufferings were at an end, has never rallied, either in strength or spirits, but after an interval not exceeding a few hours, passed in a low and sinking state, has unexpectedly, and with little perceptible alteration, expired."[1] He relates two instances of this kind, one of which is as follows: "A young lady, happily married, impressed, probably, by some unexpectedly fatal occurrence in the circle of her friends, entertained, from the commencement of her pregnancy, a morbid fear of death in childbirth, which, although unwarranted by any indication, became, from its continuance and increasing strength, a source of anxiety to one of her immediate and confidential relatives. She was attended by a skilful and experienced accoucheur, who was also her relation. He assured me that the labor was in all respects easy and safe, and that not a single unfavorable circumstance attended it. The child was still-born and imperfect. The mother died suddenly, six hours after delivery. Every region of the body was examined with care by an eminent anatomist, and presented the appearance of health."

One or two remarks appear to me to be called for in qualification of the above statement. 1. That the pain of a severe and protracted labor will occasionally produce such serious results I firmly believe, for I have known it, but I also believe it must be the pain of the second stage, either unusually severe, unusually prolonged, or unusually effective, owing to some peculiarity of constitution of the patient. I do not believe that such a termination occurs from a prolonged first stage, when the second stage is short. 2. We must not attach too much importance to the fear of dying in childbed, although it is calculated to be injurious, as a depressing cause; for we every day meet with patients who do well, notwithstanding the most decided conviction that they shall die. It probably requires, in addition, some peculiar bodily condition for it to produce its mischievous effects. 3. I think it might be suggested, with some show of probability, that the case quoted from Mr. Travers belongs rather to one of the former classes.

Dr. M'Clintock quotes a case in which there was certainly some hemorrhage, but in which the death appears to have been more owing to the exhaustion and shock of the labor. It occurred in the practice of Dr. Cuppaidge of Castlerea, who states, "In the beginning of last month, I was sent for one morning, at ten a.m., to see Mrs. C., a farmer's wife, who was the mother of five children, and of rather delicate constitution. Her last labor had been very tedious, and was terminated by instrumental assistance (the forceps, I believe). On my arrival, I learned that she had been in strong labor for three days and nights. She seemed much exhausted, and was perspiring freely, with a feeble, rapid pulse. The pains were frequent and violent, and the fœtal head was pretty low in the pelvis. After waiting some time, and seeing the child made no advance, I applied the forceps, and extracted it with ease, but not in time to save its life. The placenta came away in a very few minutes, and I put on the binder tightly. In about a quarter of an hour, observing her to yawn and appear restless, I examined if there was any discharge, and put my hand over the uterus. It felt rather relaxed, and on making pressure it contracted, expelling a small quantity of blood. By this she seemed improved, but in about twenty minutes began again to sigh and yawn, and toss her arms about, which made me grasp the uterus more forcibly, whereby a few coagula were dislodged. Symptoms of prostration, with extreme restlessness, dejection of countenance, and [illegible] intermitting pulse, now began to develop themselves, and though I gave her abundance of burnt whiskey, the only stimulant procurable, she continued to sink, and expired an hour and a half from the time of delivery."[1] There can be no question here, I think, but that the fatal result was attributable to the exhaustion and shock of labor, although, under such circumstances, very slight loss of blood has a powerful effect.

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[1] Inquiry, p. 48.

I remember a case which occurred at the Western Lying-in Hospital, and which taught me a lesson. A patient had been long in labor, and was showing signs of constitutional suffering, but as the pains were good, and the head was descending, though slowly, it was determined, in consultation, to wait for two hours. Within that time the woman delivered herself, but the shock and exhaustion were so great, that she never rallied, but sank in a few hours without another symptom. Perhaps I may be allowed to mention another case, which occurred in my own practice, as an illustration of the violent shock sustained, though the case does not fairly belong to this chapter, as the patient did not die. The wife of an officer was delivered very rapidly of twins, and immediately after, the double placenta was expelled without hemorrhage, and all seemed well. But within half an hour she complained of being weak, her pulse became quicker and feeble, and she exhibited all the symptoms of collapse. The uterus relaxed, and on pressure a clot was expelled, but the entire loss was not much more than in an ordinary labor. I had the advantage of Dr. Johnson's valuable assistance, but it was two hours before the collapse yielded to our efforts, and she then rallied. No doubt, in this case, the loss had some effect, but that was owing to the depressing effects of the shock of sudden delivery upon a delicate nervous woman, without which I am sure it would have been harmless.

There can be little difficulty in distinguishing this class of cases from the others of which I have spoken: the history, the length and difficulty of the second stage of labor, the operation, etc., will generally be sufficient, even were the symptoms more alike; but there is no *sudden* fainting, nor is the aspect of the patient that of one fainting, but rather that of one sinking gradually, but more or less rapidly, and with a severe shock to the nervous system.

The treatment which seems to have the best effect is the union of an anodyne with stimulants. Wine and brandy must be given liberally at first, until some degree of reaction is obtained, and then the quantity may be diminished, and chicken broth gradually substituted. Meantime a mixture should be added, consisting of camphor mixture ℥vj., carbonate of ammonia ʒij., and laudanum gtt. lx., of which the patient may take a tablespoonful every one, two, or three hours. The most perfect quiet should be observed, the room should be darkened, and the patient allowed to sleep as long as she can.

772. IV. The *absorption of air by the uterine sinuses*, was suggested by the younger Legallois in 1829, and by Ollivier in 1833,[2] as being possibly the cause of some, at least, of the sudden deaths after delivery. The elder Legallois had found in some of his experiments, that sudden death resulted from air penetrating to the vena cava from the uterine veins. Of the possibility of this occurrence one cannot doubt, and the researches of Dr. Rose Cormack[3] have very much elucidated this subject; his experiments and subsequent observations, justify, I think, the conclusions given by Dr. M'Clintock, viz., that the admission of air into the current of the blood is capable of destroying life suddenly; that it is highly probable that air may find an entrance into the vascular system through the uterine vessels; and

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[1] Med. Press, March 10th, 1852, p. 147.

[2] Dict. de Méd. Art. Air.

[3] London Journal of Méd., vol. ii. p. 941.

that in certain cases of sudden death after delivery, the only cause which could be detected was the presence of air bubbles in the heart and vena cava. Dr. Rose Cormack has collected seven cases in support of this view; in six, the presence of air in the veins was demonstrated, and none exhibited any other morbid lesion sufficient to account for death. He observes, "If a large quantity of air have entered the circulation, unequivocal evidence of this will be found by listening to the heart, when the churning sound will be heard. If death does not almost at once close the scene, the phenomena of asphyxia will set in, their rapidity and violence depending upon the quantity of air which has entered, on its passing up to the heart in one large volume, or in divided quantities, on the presence or absence of hemorrhage, and on the strength of the patient."[1]

There is a case related by Dr. Ramsbotham which resembles death from this cause, but unfortunately the veins and heart were not examined. The woman had been delivered of a dead child, which was followed by the expulsion of a quantity of offensive gas. The placenta had to be withdrawn, and then the uterus contracted, and the woman appeared well between two and three o'clock. Between five and six she died quite suddenly. Nothing appeared, on *post-mortem* examination, to account for her death."[2]

Another case has been recorded by Mr. Berry, more recently.[3] A woman, aged twenty-two, was delivered of her first child, after a natural labor, at seven p.m., June 17th, 1850. The placenta came away in twenty minutes, unattended by any immoderate loss of blood. At half-past eight she expressed herself as comfortable, and at eleven took some gruel. At one o'clock in the same night, her husband, who lay in the same room with her, became alarmed by the patient's difficult breathing and feeling of faintness, and immediately sent for her medical attendant, but before his arrival at two o'clock, she was dead. On examination, the abdominal organs, including the uterus, were healthy, with the exception of a granular condition of the kidneys. The mouths of the uterine vessels were patulous; the lungs were congested, and contained tubercles; the heart was enlarged and distended, and, upon making an incision into it, a gush of air escaped, and it became flaccid. No blood was found in its cavities. About an ounce of serum was found in the pericardium. The brain was quite healthy, and there were no signs of decomposition in any part of the body.

Mr. G. May, jun., has published three cases. In the first, death occurred on the rupture of the membranes before delivery. After death there was nothing to account for it but distension of the heart by air. The second died six hours after delivery, and the third on the eighth day. Nothing adequate to account for death was discovered except air in the heart and large vessels.[4]

"The mechanism," says Dr. M'Clintock, "by which the introduction of air into the veins can be effected, admits of being explained in a few words. The veins of the gravid womb present four remarkable characteristics—viz., their extraordinarily large size, their freedom of inosculation, the total absence of valves, and their termination on the internal surface of the uterus, at the site of the placenta, by large open orifices. If the uterus be examined soon after delivery at the full term, the majority of these apertures will readily admit a goose quill, and some will even allow the little finger to penetrate without laceration. During contraction of the uterus all the openings are hermetically closed, but when it is relaxed, they again become proportionally more or less patulous. From this it is manifest that the same condition of the organ which causes flooding is exactly that which is indispensable for the ingress of air; so that the latter, when it does take place, is almost of necessity preceded or accompanied by hemorrhage.[1]

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[1] London Journ. of Méd., vol. ii. p. 950.

[2] Pract. Obs. in Midwifery, p. 122.

[3] Prov. Med. and Surg. Journal, Nov. 27th, 1850.

[4] British Med. Journal, June 6th, 1857.

But the question then arises, How comes air into the uterine cavity? It may penetrate, doubtless, during the process of expulsion of the child, or during the interval before the expulsion of the placenta, or it may be the result of decomposition, as in Dr. Ramsbotham's case. That air is expelled from the uterus occasionally, during, or immediately after labor, we know. Dr. Meigs has noticed it a great many times; Dr. Rose Cormack has also observed it; Dr. M'Clintock witnessed it in four different cases; I have repeatedly noticed it; and it is mentioned by other writers. So that we may conclude, with Dr. Cormack, "I have not only no difficulty in believing, but am constrained to admit, that should any impediment be offered in such cases to the free exit of air by the os uteri, it must be forced into the uterine veins, were their mouths not protected by coagula; and thence it would rapidly pass, by the current of the circulation, up the vena cava, into the right auricle."[2]

The intensity of the symptoms probably depends partly on the quantity of air and partly on the condition of the patient. Death may occur suddenly, or, life being prolonged, the patient may die of asphyxia at a later period. The character of the symptoms in the severer cases being similar to those in the cases of fatal syncope or of idiopathic asphyxia, renders the diagnosis between the three during life almost, if not quite, impossible; it is only by the detection of the presence of air in the heart or great vessels after death, that we can positively assure ourselves of that having been the cause of death.

As to the *treatment* of these cases, Dr. Rose Cormack observes, "In the most rapid class of cases in which death is suddenly threatened from paralysis of the heart from over-distension, we must first strive to relieve the heart from that condition; when the phenomena are chiefly those of asphyxia from more gradually increasing obstruction in the lungs, the various means for treating asphyxia must be resorted to, and among these, in many cases, I believe the alternate use of hot and cold douches will be found to be very valuable, especially if combined with stimulants, judiciously varied, and skilfully administered, externally and internally. In many instances repose, dashing cold water in the face, keeping the surface warm, and time, may be the only means which ought to be used."[3]

773. V. The *formation of a fibrinous coagulum* in the heart was first pointed out by Dr. Meigs as a possible cause of death. He says, "It is well known that the coagulability of the blood is greater in proportion as any hemorrhage progresses; therefore a woman who has lost during her labor forty or eighty ounces of blood, has the rest of it more coagulable than it was before the flooding commenced. Again, fainting consists in the too little intensity of the presence of blood in the brain; and a woman just gone through a flooding, experiences a sensation of faintness from lessened vascular distension of the encephalon. If she suddenly assume an erect position, the tension becomes instantly lessened in consequence of the gravitation of the blood. But (and this is the danger) if she faint badly while her blood is become thin and highly coagulable from hemorrhage, the scarcely moving current partially stops in the heart, and when she comes out of the deliquium, if ever, she does so with a coagulum in the auricle and ventricle; she has got a false polypus in the cavities, and will surely die."[4] In another place he observes, "I beg you to consider briefly the effects to be produced by a mass of fibrinous remainder of a clot suddenly found within,

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[1] Medical Press, March 10th, 1852, p. 147.

[2] London Journal of Medicine, vol. ii. p. 941.

[3] Ibid., vol. ii. p. 938.

[4] Obstetrics; the Science and the Art, p. 308.

and moulded by the cavity or cavities of the heart. Inasmuch as the venous blood can only get back to the arterial side by passing through the pulmonic heart, such a clot, if of large size, must either wholly or very greatly hinder the return of the venous blood. In fact, it would be equal to a partial ligation of the cava superior or inferior. Death is likely to follow the occurrence, either immediately or within a few hours. I have observed it to occur within eighteen hours, in thirty-six hours, in eighteen days."[1] In one case he mentions, the symptoms were sudden sinking, mental anxiety, rapid pulse, and effusion into the pleuræ. A *post-mortem* justified his diagnosis.

A case in which the cause of death was considered to have been a clot in the heart, is related by Dr. Keith. He attended the patient of twins, Nov. 1850; the labor was tedious, and she was kept under the influence of chloroform for thirteen hours. The first child was delivered by the forceps; the second came footling. When the placentæ were expelled, there was a great rush of hemorrhage, which was arrested by the contraction of the uterus. The patient fainted; but gradually recovered; slept; and on awaking, showed no unusual symptom. From this time to the fifth day she went on pretty well, considering the previous history. The lochia were natural, and there was some milk in the breasts. "During this whole period, however, there was an unusual degree of restlessness, and an undefined feeling of discomfort, for which, though frequently asked, she could give no definite cause. The pulse was also faster than usual, and very small." "On the morning of the fifth day, the nurse told me that she had spent a good night; and her own principal request was, that she might have a partridge for dinner. On feeling the pulse, however, it was much more rapid than on the preceding day, and very feeble." "I left at ten o'clock, and at twelve an urgent message was sent to my house. As I was out at the moment, Dr. Duncan was sent for, and at half-past twelve he found her pulseless, and evidently sinking. I saw her half an hour later; she seemed then to have very slightly revived, after taking a large quantity of champagne and brandy. The pulse was, however, quite gone at the wrist, the heart's action extremely rapid and feeble, the breathing very laborious." She died at three o'clock. On examination, an effusion of serum and a thin layer of lymph were found in the peritoneal cavity; the uterus was healthy; the right side of the heart was unusually distended; "and on opening the right auricle it was found quite filled with a large mass of fibrine, quite colorless, and especially at one part, where it adhered to the wall of the auricle, of a firm and leathery consistency."[2] It is a little difficult in this case to disentangle the effects of the latent peritonitis from those of the clot in the heart. I have seen more than one case of fatal peritonitis of which there were no characteristic symptoms during life, the main anxiety being caused by the quick pulse; but I think in the present case there appear to have been symptoms resembling asphyxia, which can hardly be said to be referrible to the peritonitis.

The only practical inference from such cases is, the care necessary not merely to arrest hemorrhage, but to guard the patient against its consequences. The horizontal position, with the head as low, if not lower than the body; the use of stimulants and nutriment, judiciously administered; the equable warmth of the body after the hemorrhage has ceased; and above all, great caution, for several days, about sitting up in bed, or removing to the sofa, and making any exertion, are all available means for the prevention of this accident, which ought never to be neglected.

774. VI. *Disease of the heart.* — For more than one reason, we might naturally fear for the result of delivery when there exists organic disease of the heart. The disturbance of the circulation, and the impediment to the

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[1] Woman, and her Diseases, p. 577.

[2] Ed. Monthly Journal, Jan. 1852.

free course of the blood which vavular disease offers, even in moments of tranquillity, must be many times increased during the turmoil of labor, with its repeated arrests of respiration and recurring congestion. If under ordinary circumstances the impediment gives rise to effusion, much more may such a result be expected during the labor; and an effusion into the cavity of the arachnoid, pleura, or peritoneum may be very serious. Again, after delivery, the volume of blood previously required for the fœtal nutrition, and circulating in the uterus, will be thrown into the general circulation, adding to the existing embarrassment of injured valves, or a diseased heart, unless, indeed, there be considerable discharge — which in turn, however, if excessive, may equally, though for an opposite reason, be a source of trouble.

At a meeting of the Edinburgh Obstetrical Society,[1] "Dr. M'Cowan stated that on the 16th of June, 1846, he was requested to visit Anne Barker, aged twenty-one, said to be in labor of her first child.. On his arrival, he found her suffering from spurious pains, and complaining much of difficulty of breathing, and pain in the left sub-mammary region. The face was very œdematous, as also the lower extremities. Under the usual treatment, the pains subsided. During the two following days, she complained occasionally. On the 19th, she had much pain in the side; respiration laborious; pulse, which had hitherto been about 70 or 80, rose to 120, but feeble. Venesection to ten ounces produced faintness without alleviating the pain. She was then cupped to four ounces with immediate relief. About three a. m. of the 20th, labor commenced, and proceeded naturally and speedily till nine a. m., when she was delivered of a still-born male child, and instantly expired.

"*Post-mortem.*—The body presented a generally œdematous appearance. On opening the thorax, the pericardium was found distended with a dark fluid. The heart was much enlarged, extending about two inches to the right of the sternum; right ventricle very thin and dilated. The aortic opening could with difficulty admit the point of the little finger; its valve was hard and cartilaginous. The whole heart was filled with coagulated blood. The surfaces of the pleuræ were strongly adherent; the greater part of the left lung was hepatized. The uterus and other organs seemed healthy."

At the same meeting, Dr. Simpson mentioned that he had seen a similar case of sudden death some years before, and which, from the history of the patient, he attributed to disease of the heart.

Dr. M'Clintock mentions, that on two occasions he has seen a patient die almost under his hands, immediately after delivery, from this cause; and he mentions another lady who died suddenly on the tenth or twelfth day, and who was known to labor under organic disease of the heart. He relates also another case, furnished to him by Dr. Fitzpatrick, in which death took place on the fifth day, and which seems, at least in a great measure, attributable to the same cause.

A case of sudden death, on the day after delivery, has been related by Mr. Young,[2] in which no abnormal appearance was detected, except hypertrophy of the heart and disease of the aortic valves. Mr. Young attributes her death to this and to the distended state of the stomach, and large size of the liver arresting the functions of the heart.

Now there is no difficulty in such cases in detecting organic disease; and if the accoucheur do ascertain the fact, is he justified in remaining passive? I think not. If, as these cases show, the original embarrassment of the circulation may be increased to a fatal degree by continued labor, why allow it to go on? We cannot prevent labor, but surely we can shorten it; and if ever there is a case in which the use of the forceps is justifiable merely to shorten labor, this is certainly one. I am happy to have the authority of

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[1] Ed. Monthly Journal, May 1849, p. 766.

[2] Association Journal, Nov. 19th, 1853.

Dr. Simpson to confirm this opinion; and still more happy to be able to quote a successful case so treated. In the summer of 1851, my friend, Dr. Stokes, asked me to take charge of a patient who had been admitted into the Meath Hospital, with extensive valvular disease of the heart, disturbed circulation, dyspnœa and œdema. She was in the eighth month of pregnancy at that time; and before the end of the ninth month, under Dr. Stokes's judicious treatment, the œdema had subsided, the circulation become tranquillized, and the respiration easy, unless she were agitated or exerted herself. Fearing the effect of labor upon her diseased heart, I determined to shorten it as much as possible. I arrived at the hospital about half an hour after the commencement of labor, fortunately the os uteri had rapidly yielded, and I found the head in the pelvis. I immediately applied the forceps, and delivered her in about five minutes of a living child. The placenta was expelled immediately. When I applied the forceps, she was beginning to show signs of distress in respiration, and more than usual congestion; but after delivery this instantly subsided, and she recovered speedily and well from the labor.

775. VII. *Obstruction and rupture of the pulmonary arteries.*—We are indebted to the researches of Mr. Paget for a knowledge of the effects of obstruction in these vessels; and in his second paper he suggests that many of the cases of sudden death for which no apparent cause has been found, may have been owing to clots obstructing the pulmonary arteries, and that the cause of this coagulation is some change in the composition of the blood.

The first case of the kind recorded, I believe, is the following, by Mr. Havers.[1] A delicate lady, aged thirty-four, was delivered of her second child, after a natural and easy labor. The removal of the after-birth was attended with some little difficulty, and was followed by a gush of blood so sudden and violent as to place her life in imminent danger. This took place on the 18th of August, and she progressed favorably till the morning of the 23d, when her attendant "found her restless, her countenance sallow, her eye unusually bright and wandering, and her manner catching and irritable. She said she had passed a bad night, which she referred to the fulness of her breasts producing a feeling of palpitation and distress at the pit of the stomach. Her tongue was slightly coated, and her pulse as usual, quick and weak." These symptoms subsided under an alterative dose, and matters went on well until the morning of the 30th. "She had been on the sofa and easy chair each day, was in good spirits, and apparently in good health. On that day she was better than usual; she made her lunch at an early hour, and told her nurse that she was so well that she would dress herself without assistance; while in the act of dressing she fell on the bed; the nurse observed some frothing at the mouth, and slight convulsions of the face. She spoke feebly once, then laid herself back and died." Mr. Paget was present at the *post-mortem* examination. "With the exception of the cicatrix of an old abscess in the apex of the right lung, and paleness of the heart, to be just now referred to, the organs were generally healthy. The muscular structure of the heart was pale and thin, especially that of the right ventricle, which contained some dark blood. Each of the pulmonary arteries contained a clot of blood nearly filling the calibre of the vessels. The chief clots were about an inch and a quarter in length, mottled and firm, and in some instances slightly adherent to the sides of the vessel. In tracing the divisions of the artery, numerous other clots were found, of the same character as the larger ones, and extended even into the smaller ramifications of the arteries." Mr. Paget was of opinion that these clots existed two days before the death of the patient.

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[1] Med. Times and Gazette, Feb. 14th, 1852.

Since the publication of the foregoing case an additional example has been afforded in an illustrious exile. The Duchesse de Nemours recovered very well after her confinement, and on the 14th day, whilst her maid was dressing her hair, she suddenly exclaimed, "I feel ill," and died. A *post-mortem* examination showed that death was owing to a clot in the pulmonary artery.

And still more recently Dr. Mackinder has related two cases. "In the first, the patient was 32 years of age, and had been delivered of her second child after a natural and easy labor. Seventeen days afterwards, while apparently in good health, she rose up convulsively, said she was choking, and died. On subsequently examining the body, a large, branching, fibrinous plug was found completely stopping up the right pulmonary artery, and its immediate ramifications, while the entrance to the left pulmonary artery gave lodgment to a large and tolerably firm concretion. The heart was rather thin, and the lungs slightly congested, but there was no further trace of disease about the body. "In the second case, the patient had an easy labor, and for a few days afterwards all appeared to progress favorably, when she imprudently left her bed-room, and exposed herself to cold. Shortly afterwards she was seized with difficulty of breathing, gasping, and cold clammy sweats, from which death relieved her in twenty minutes."[1] Unfortunately a post-mortem examination could not be obtained. How far these obstructions may be the result of simple coagulation, or in part, at least, owing to what Virchow has termed "embolism," is difficult to say until our information is more complete.

A very interesting case of rupture of the right pulmonary artery during labor, followed by instant death, has been published by Dr. Crooke.[2] The labor was going on slowly, but well, and on the occurrence of a powerful expulsive pain, the patient's face became livid, and she complained that "her heart was leaving her," and died in a few minutes. On *post-mortem* examination all the viscera were healthy; there was fluid blood and coagula in the cavity of the chest, which was found to have escaped from a rupture of the right pulmonary artery.

Of course, it will require more observations before we can arrive at any very positive conclusions; it does not seem improbable, however, that such clots, which would more readily form after hemorrhage, might occasion asphyxia and death. In the present state of our knowledge of the subject, I fear we can deduce no further practical instruction than the necessity of arresting hemorrhage as speedily as possible, and keeping the patient in an horizontal position until the blood has so far recovered as to lose its disposition to coagulation.

776. VIII. *General dropsy.*—When ascites and anasarca occur to a considerable extent during pregnancy, the patient may die immediately after delivery, without any very obvious cause, but apparently from asphyxia, as the following case will show: Mrs. ——, aged thirty-eight, was in the sixth month of her fourth pregnancy when she suddenly became dropsical: the hands, arms, body, and lower extremities were swollen; there was much fluid in the peritoneal cavity, for she was larger than if at the full term. The pulse was 120, and the respiration sometimes difficult, and always hurried. Labor came on unexpectedly in the country, and I did not see her until it was over. The child was dead; the placenta had to be extracted, and though there had been some hemorrhage, she had not the aspect of a person sinking from that cause. When I saw her her lips were blue, her aspect pale but not pallid, the surface warm, the respiration hurried, and the pulse 100, and weak. She had spoken after delivery, but could not answer my

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[1] Med. Times and Gazette, July 23, 1859, p. 96.

[2] Medical Press, Sept 17th, 1853, p. 193.

questions, though she seemed to understand me. She had no convulsions, nor any head symptoms. She gradually sank in spite of our utmost efforts, and died about three hours after delivery. No *post-mortem* was permitted. What was the immediate cause of death? Not hemorrhage, nor an affection of the head — not fainting, certainly. There may, for aught I can tell, have been a clot in the heart, but I came to the conclusion that it was asphyxia, from effusion into the lungs.

777. IX. *Minute perforation of the intestine.* — I saw a case of this kind a short time ago, which might have been mistaken for one belonging to some of the former classes, had there not been a *post-mortem* examination. Mrs. C——, aged thirty, was confined of her first child after a natural labor, and recovered well up to the sixth day, except that she had no milk. On the sixth day she had an attack of weid, without abdominal pain, from which she recovered as usual after twenty-four hours. On the tenth day she had a rigor, with diarrhœa, and some griping pain, from which she was soon relieved. On the twelfth day the rigor returned, with abdominal uneasiness and slight tenderness, a pulse of 110, no thirst, some diarrhœa, the lochia natural. At this time I saw her; and leeches having been applied, calomel and opium given, I merely suggested a full opiate at bedtime. The next day she was much better; pulse 84, neither pain nor tenderness of the abdomen, no rigor, and the bowels quiet. The day after I did not see her, as she told her medical attendant in the morning that she felt quite well. On his visit the next morning (the fifteenth day after delivery), he found her in a state of the most complete collapse, pulseless, voiceless, and bathed in a cold clammy sweat. She rallied a little under the use of stimulants, but died in the evening. At the *post-mortem* examination we found no peritonitis, and the uterus was perfectly healthy; but the termination of the ileum and commencement of the colon were much inflamed, and on raising this part of the intestine a quantity of fluid fœcal matter escaped from a minute perforation, and we found more of it in the pelvis. In this case the cause of death was evident — collapse after perforation; but the extreme minuteness of the perforation, and the rapidity with which death took place, were very remarkable.

778. *Scarlatina.*—The first of the following cases may fairly be considered one of sudden death, and I believe it is the only one of the kind recorded. I have added the second as illustrative, although the patient recovered.

Case I.—December 14, 1858, sent for to Mrs. S., and received the following history:—A delicate lady, suffering a good deal during pregnancy, taken in labor of her fifth child December 13, and was delivered early in the morning, after an easy labor of a few hours. Placenta came away naturally; no hemorrhage; pulse quiet and good.

During the day she went on quite well; lochia natural.

In the evening Dr. Smith found the pulse alarmingly quick and very weak, without anything to account for it. No pain; no local distress; no excessive discharge.

Dr. Jacob, of Maryborough, was sent for, but nothing local or general could be ascertained with any certainty to account for it, unless it might be the commencement of a latent form of uterine phlebitis. Some calomel had been given on this supposition, but was suspended on account of diarrhœa. Nourishment and wine were liberally given, with benefit to the pulse and strength. The next day, December 14, I was sent for, and arrived at 10 P.M., the report at that time being that the patient was rather better. I found that there had been no rigor; there was neither enlargement of the uterus nor tenderness of it or any part of abdomen; no swelling; no tympanitis; lochia plentiful, but rather pale, and not offensive; urine copious and passed naturally; pulse 140, very weak and wavy. Upon minute questioning, she told me that she had neither pain nor distress of any kind. Countenance pale, but calm and easy; neither hurry nor distress in breathing, alæ nasi quiet; no headache. I examined the chest very carefully; on percussion it was resonant everywhere; respiratory murmur full and equable; not an abnormal sound throughout. Upon examining the heart, there was no enlargement, but the rhythm of the sounds was destroyed by the disappearance of the first sound; there was no impulse, but the second sound was natural.

This, then, was the only deviation from the healthy condition that I could detect, after a most careful examination of every organ of the body. And what explanation did it afford of the perilous condition of the patient? I confessed that explanation I had none to give; all I ventured to say was, that the uterine system was not in fault, but that the disease was in the heart or circulating fluid.

I lay down about 2 o'clock, and at 5 A.M., they came to me to say that the pulse had begun to sink again. I found her in precisely the same condition as before, with that exception. The pulse was 150 or 160; the respiration rapid, but not difficult; and, in spite of strong stimulants, her state went from bad to worse, until she lost the power of swallowing, became insensible, and finally died about 11 A.M., without pain, struggle, or convulsion.

I returned to town, I may frankly confess, very much puzzled, and by no means comfortable; but the mystery was cleared up when I heard, two or three days afterwards, that the nurse and the lady's husband were laid up with a very severe form of scarlatina. I have no doubt that the scarlatina poison, acting on a system weakened and rendered unusually susceptible by delivery, had caused death before the ordinary symptoms of that disease had time to develop themselves.

CASE II.—On February 23d, Surgeon Morgan asked me to visit Mrs. B. with him. She had been confined, February 21, of her thirteenth child, after a natural labor, and was doing well until the morning of the 23d, when she awoke with palpitation and a weak pulse of 140, but without pain.

I found the pulse 130, and very weak. There was a nervous tremulousness about her, and a frightened look. She complained of nothing but excessive weakness; no pain, no distress. The uterus felt rather larger than usual, but not tender; lochia quite natural, and without odor. Some milk in the breasts. On examination the lungs appeared perfectly healthy, and there was no abnormal sound in the heart, but the first sound was weaker or less loud than the second.

In short, we could find no satisfactory local cause for the patient's condition, and, in fact, no deviation from organic health, except in the rhythm of the heart. Remembering the former case, I asked if any of the family had recently had scarlatina or measles, but was told that they had not. Under such absence of grounds for correct diagnosis, it was clear that our duty was to treat the prominent symptom (exhaustion) actively, whilst we took some precautions as to certain possibilities.

This we did by the exhibition of stimulants and nutriment, and by poultices to the abdomen. Without troubling the reader with the daily report, I may briefly state that the patient became weaker on the 24th and 25th; at noon of which day Dr. Morgan thought she was dying. No local derangement could be detected at any time, and she took freely, and retained, both food, spirits, and medicine. Her nights were rather restless, and her sleep not refreshing. On the evening of the 25th we determined to try the full exhibition of quinine, and accordingly gave her six grains at bedtime, and three grains every three hours when awake.

The next day there was a perceptible improvement; she had slept better, and felt more comfortable. The pulse was only 120, though weak. The quinine, claret, and Hoffman's liquor were continued.

February 27. A more decided improvement. Pulse 116, fuller and firmer; feels stronger, and had no weakness at noon, as previously. As she complained of headache and singing in the ears, the quinine was omitted, but food and wine continued.

On the 28th I found her so much better that I ceased my attendance. She had slept very well; pulse 104, and fuller; no local distress; no feeling of excessive weakness. From this time Dr. Morgan informs me that convalescence progressed favorably.

Up to this point we were at sea as to the nature of the attack, although we had the benefit of Dr. Corrigan's assistance; but on the evening of the 28th I think the solution of the problem was afforded by the fact of one of the servants showing unmistakeable evidence of scarlatina.

I fear it may be thought that I have extended this chapter to a disproportionate length; but the subject is new in a systematic treatise, and so inadequately understood, that I felt that the main value would consist in a detailed account of the principal facts which have been recorded. When the subject is better known, we shall be able to condense.

CHAPTER XXV.

PUERPERAL FEVER.

HAVING now terminated the series of abnormal deviations from natural labor, and the various accidental complications of that process, I shall add a chapter or two upon some of the more formidable diseases of childbed, referring the reader for fuller details and references to my work on Diseases of Women.

779. PUERPERAL FEVER is probably the most fatal disease to which women in childbed are liable, and it is by no means of rare occurrence. Its phenomena vary very much, and it has consequently been differently described, and under various names, such as Puerperal Fever, Childbed Fever, Peritoneal Fever, Low Fever of Childbed, etc. Another source of apparent contrariety has been the *prevalence of the disease epidemically, and the varying characteristics of these epidemics.* Unfortunately, the uniformity of the disease was assumed until comparatively recent times; and, as Dr. John Clarke observes, each author erected his own experience into a standard by which to judge of the descriptions and practice of others.

According to Dr. Hulme's researches, the older writers were not ignorant of this disease. It is described by Hippocrates and Avicenna. Plater (1602) makes it to consist in inflammation of the uterus. Sennert (1656) describes it, and recommends bleeding. Riverius (1674) attributes it to suppression of the lochia, and Sylvius (1674) to deficiency of the [illegible] Willis (1682) takes the same view of its nature as Plater. It is [illegible] by Reynalde, Pechey, Strother (by whom it was first called Puerperal Fever), and other early English writers; by Viardel, Peu, Mesnard, and other ancient French authors, and by the Germans.

From careful investigation it has been proved that the disease prevails epidemically, and that it is more virulent in hospitals. It is everywhere more frequent among the lower classes than the higher. In Dublin this is even more remarkably the case than in London.

780. For the purpose of giving a more distinct view of the prevalence of puerperal fever, I have made out (as accurately as possible) a chronological list of the different epidemics, with the names of the authors by whom they are noticed or described, and the pathological characteristics when ascertained.

Date of Epidemic.	Place.	Author.	Characteristics.
1664	Paris,	Peu, (Lee).	
1746	Paris,	Malouin,	Peritonitis, Hysteritis, etc.
		Jussieu,	Disease of Ovaries.
1750	Lyons,	Doulcet,	Peritonitis, U. Phlebitis.
1750	Paris,	Pouteau,	Hysteritis, Erysipelatous.
1760	London,	Leake,	Inflam. of Omentum, etc.
1760–61	Aberdeen,	Gordon.	
1761	London,	White,	Peritonitis.
1767	Dublin,	Jos. Clarke.	
1769	London,		
1770	London,	Leake,	Peritonitis (partial).
1771	London,	White.	
1773	Edinburgh,	Young.	
1774 to 81	Paris, London, Vienna,	Tenon, Doulcet, etc.	
1774–87, 88	Dublin,	Jos. Clarke,	Peritonitis.
1782	Paris,	Doulcet,	Peritonitis, Hysteritis.
1783	London,	Osborn,	Peritonitis.
1795	Vienna,	Jaeger,	Peritonitis, Phlebitis.
1786	Paris,	Tenon.	
1787	Göttingen,	Osiander.	
1788	London,	Jos. Clarke,	Hysteritis, Peritonitis, etc.
1787–8	London,	Do.	Peritonitis, Hysteritis, etc.
1789–90, 91, 92,	Aberdeen,	Gordon,	Peritonitis.
1803–10. 12, 13,	Dublin,	Collins, Douglass,	Peritonitis.
1808	Barnsley, Yorksh.	Hey,	Peritonitis.
1812–13	Leeds, Yorkshire,	Hey,	Peritonitis.
1813	Sunderland, counties of Durham, and Northumberland, Dublin,	Armstrong,	Peritonitis.
1811	Heidelburg,	Naegelè. Bayrhoffer.	
1812	Holloway, London,	Dun,	Peritonitis.
1814–15	Edinburgh,	Hamilton.	
1816	Paris,	Tenon,	U. Phlebitis, Hyster. Perit.
1817–18	Pennsylvania, U.S.	Dewees,	Peritonitis.
1818–19, 20–23	Dublin,	Collins,	Peritonitis.
1819	Vienna,	Boer.	
1819	Glasgow,	Burns.	
1821–22	Edinburgh,	Campbell,	Peritonitis.
1821–22	Glasgow, Stirling,	Campbell,	Peritonitis.
1827–28	London,	Gooch,	Peritonitis.
1827–28. 29,	London,	Ferguson,	Peritonitis, Hysteritis.
1835–36–38	London,	Do.	Phlebitis, etc.
2825–27, 28, 29	Dublin (Lying-in Hospital,)	Collins.	

Date of Epidemic.	Place.	Authors.	Characteristics.
1829	Paris, (Maternité),	Tonnelle,	Inflam. of Peritoneum, Uterus and appendages, and Uterine Phlebitis.
1829–40, occasionally,	London, Birmingham, Dublin (Lying-in-Hospital.)	E. Kennedy.	
1831	Birmingham, Aylesbury,	Ceeley.	
1833–34	Vienna,	Bartsch,	Uterine Phlebitis.
1836–7	Dublin, (New Lying-in-Hos.	Beatty,	Peritonitis, Pleuritis, etc.
1838	Paris, London.		
1842	Rennes, London.		
1843	Rouen.		
1844	Rouen, Rennes.		
1845	Rouen, Paris, Grätz.		
1846	Rouen, Dublin, Scotland.		
1852	Brakel, Westphalia,	Disse,	Typhoid fever.
1854–5	Dublin,	M'Clintock,	Do.

781. From a review of the history of the epidemics of puerperal fever, it appears that there is some remarkable connection between them and lying-in hospitals. I do not mean to assert that the epidemics always originate in and are kept up by these institutions, but I refer to the fact that we have no record of any epidemic independent of them in earlier times. The first in France, England, and Ireland occurred in the Hôtel Dieu of the former, and in the lying-in hospitals of the latter countries; and although our earlier writers allude to inflammation of the womb, etc., occurring in childbed, they make no mention of its prevailing extensively or as an epidemic. No doubt it has since been observed in private practice, in London, Edinburgh, Dublin, Leeds, etc.; but its extent in these cases is, after all, comparatively limited. In Dublin the higher ranks have been singularly free from attacks of the disease. Dr. Joseph Clarke practised for forty-four years in this city, during which time he attended 3847 cases of midwifery, and yet in that number he met with only three cases of peritonitis, and three others where the disease is doubtful, but which may have been uterine phlebitis, although, during that time, puerperal fever was more than once epidemic in the hospital. It has, however, certainly been more frequent of late years.

782. Perhaps the most general fact connected with puerperal fever is the presence of local disease. In almost all cases of the epidemic, when an opportunity of *post-mortem* examination has been permitted, local lesions of some kind or other have been detected, and even where this opportunity was denied, little doubt was felt by the medical attendants that such existed. It seems very probable, also, that in many cases where the local disease seemed but slight, there would now be recognized very important changes, for we know that a patient may die of inflammation of the uterine veins or lymphatics, with very obscure symptoms, and without either enlargement or obvious tenderness of the uterus, and that these morbid lesions may easily be overlooked if the examination be hasty or superficial. It is only fair, however, to state that Dr. Copland, in an excellent article on puerperal fever, differs from this view. He states that his experience has "convinced him that a most rapidly fatal and a most malignant form of puerperal fever is

occasionally developed in lying-in hospitals, which is certainly not characterized by uterine phlebitis nor by purulent collections in the uterus or its appendages, nor even in some cases by peritonitis, the chief lesions often being merely a remarkable alteration of the blood, general lacerability of the tissues, or loss of their vital cohesion soon after death, with a dirty, muddy, offensive, and sometimes a scanty effusion into the serous cavities."[1] He adds, however, that such cases are rare.

The local affections in puerperal fever embrace all the usual results of inflammation, and involve all the tissues of the organs of gestation, either separately or together. The most frequent appears to be peritonitis, originating very probably in the outer covering of the uterus, but spreading to the entire serous cavity. We find also inflammation of the muscular tissue of the uterus with its consequences, abscess, softening, and gangrene; inflammation of the lining membrane, softening, and gangrene; inflammation of the veins and lymphatics, with the secondary affections thence arising, inflammation and purulent deposits in different organs, muscles and joints; and inflammation of the ovaries, with its consequences.

783. I must repeat my conviction that there are not many cases of puerperal fever without some local disease of the organs employed in parturition, or of the neighboring tissues; but are we thence necessarily to conclude that puerperal fever is always simply a local affection, the local disease being primary and the fever secondary? Must we adopt Dr. Robert Lee's opinion, that his "observations are subversive of the general opinion now prevalent, that there is a specific, essential, or idiopathic fever, which attacks puerperal women, and which may arise independently of any local affection in the uterine organs, and even prove fatal without any change in the organization of their different textures? As the constitutional symptoms thus appear to derive their origin from a local cause, it would certainly be more philosophical and more consistent with the principles of nosological arrangement to banish entirely from medical nomenclature the terms puerperal or childbed fever, and substitute that of urine inflammation, or inflammation of the uterus and its appendages, in puerperal women."[2]

In the former editions of this work I adopted Dr. R. Lee's views, and employed his arrangement; but whilst I confess my obligations to his able researches, and agree with him as to the presence of local lesions generally, I am bound to state honestly and frankly that more extended experience has led me to doubt the accuracy of these views, and to believe that malignant puerperal fever is something more than a local affection, and that the constitutional disease is often rather primary than secondary. At the same time I have no doubt that Dr. Lee's views are applicable to many cases.

What, then, is the essential nature of the malignant epidemic, puerperal fever? This is a question not easy of solution, and one which has led to the expression of very different opinions. It has been regarded as

Inflammation of the Uterus, by

Hippocrates,
Galen,
Celsus,
Ætius,
Paulus Avicenna,
Raynalde,
F. Plater,
Sennert,
Riverius,
Sylvius,
Strother,
Mauriceau,
La Motte,
Sydenham,
Böerhaave,
Van Swieten,
Hoffmann,
Jussieu,
Villars,
Astruc,
Pouteau,
Denman.

Inflammation of the Omentum and Intestines, by

Hulme,
Leake,
La Roche.

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[1] Dictionary of Pract. Med. Part xiii. p. 500.

[2] Researches on the more Important Diseases of Women, p. 8.

Peritonitis, by

Waller,
Johnson,
Forster,
Cruikshank,
Bichat.
Pinel,
Gardien,
Capuron,
Gordon,
Hey,
Armstrong,
Clarke,
Campbell,
Collins.

Peritonitis connected with Erysipelas, or of an erysipelatous character, by

Pouteau,
Home,
Lowder,
Young,
Abercrombie,
Gordon,
Armstrong,
Hey,
Campbell, etc.

Fever of a peculiar nature, by

Willis,
Puzos,
Levret,
Doublet,
Hamilton.

Disorder of a putrid character, by

Peu,
Tissot,
Le Roi,
White.

Disease of a complicated nature, by

Petit,
Sellè,
Kirkland,
Walsh,
Tenon,
Tonnellè,
Lee,
Ferguson.

Fever with Biliary disorder, by

Finch,
Stoll,
Doulcet.

If we regard the peculiar characteristics of different epidemics, we find them extremely varied. In one, the lochia are suppressed; in another, they are profuse; and in a third, unaltered. Diarrhœa is common in one epidemic, constipation in another; typhoid symptoms in one; inflammatory in another. And as to the effects of remedies, we find as great a diversity; one high authority recommends saline purgatives, which fail in the hands of other practitioners; another loses all his patients until he bleeds largely at the commencement, whislt others lose all who are so bled. Calomel is the universal remedy in one epidemic, opium in another, purgatives in a third, inunctions in a fourth, turpentine in a fifth, etc.

Now, from these variations, the inference is obvious, that the *type of the disease varies in different epidemics, and that the treatment must necessarily differ*. But I think we may go a step further; and if any one will carefully compare a case of simple inflammation of the womb or peritoneum in childbed with a case of malignant epidemic puerperal fever, their symptoms, general and local characteristics, course, and the effects of remedies, he will be obliged to come to the conclusion that, although the latter may exhibit local disease, it is not exclusively nor primarily a local affection.

784. I should wish to speak very cautiously and guardedly on so difficult a subject, but after a careful comparison of the experience of others with my own, I am inclined to believe that the essential difference between epidemic puerperal fever and simple inflammation consists in a morbid deterioration of the blood in the former case, which is rarely present in the latter, or not till an advanced stage; whether this deprivation result from some general noxious influence or from some malign peculiarity of the constitution. The following considerations seem to support this view: 1. Puerperal fever prevails most during the winter and spring months, in moist and cold weather, or during alternations of cold and warm moist weather, as the following table shows:—

TABLE I. (*Dr. Gordon's.*)

	Cases of Puerperal.		Cases of Puerperal.
October	18	April	6
November	8	May	6
December	12	June	
January		July	
February	8	August	5
March	6	September	5

TABLE II. (*Dr. Campbell's.*)

	Cases of Puerperal.		Cases of Puerperal.
1821, March	1	1822, January	7
" April	7	" February	6
" May	2	" March	5
" June	2	" April	4
" July	8	" May	4
" August	1	" June	8
" September	1	" July	2
" October	7	" August	1
" November	18	" September	8
" December	11	" October	2

TABLE III. (*Dr. Ferguson's.*)

	1827	1828	1820	1830	1831	1832	1833	1834	1835	1836	1837	1838	Total.
January	. .	2	8	8	. .	2	. .	. .	2	4	8	9	34
February[1]	. .	2	7	. .	. .	. .	. .	. .	2	6	. .	. .	17
March	1	. .	8	2	. .	. .	1	. .	. .	6	. .	8	22
April[2]	8	. .	1	1	4	1	2	8	2	6	8	9	34
May	4	4	. .	. .	1	. .	2	. .	5	2	2	. .	20
June	. .	8	. .	. .	. .	1	2	. .	6	4	. .	. .	16
July	. .	8	. .	. .	. .	2	. .	. .	. .	. .	. .	. .	5
August	. .	8	1	. .	. .	. .	. .	. .	. .	. .	. .	. .	4
September	2	8	. .	. .	. .	. .	1	. .	. .	. .	. 1	. .	12
October	. .	4	6	. .	. .	2	. .	. .	5	. .	. .	. .	11
November	. .	. .	. .	1	2	. .	. .	4	2	. . .	. .	. .	9
December	. .	8	8	. .	2	. .	1	2	2	8	. .	. .	21
Attacked	10	87	24	7	9	8	9	9	26	81	9	26	205
Died	1	7	6	2	2	5	8	5	10	9	2	20	68

TABLE IV. (*M. Dugès'.*)

	Cases.		Cases.
1819, January	81	1819, July	40
" February	82	" August	40
" March	65	" September	53
" April	47	" October	69
" May	67	" November	74
" June	35	" December	63

TABLE V. (*M. Delaroche's, Geneva.*)

	Cases.		Cases.
January	77	July	37
February	48	August	36
March	76	September	51
April	55	October	51
May	35	November	66
June	40	December	61

[1] Hospital closed Feb. 1838.

[2] Closed from April to Nov. 1838.

Thus, the most injurious months in Aberdeen were October, December, November; in Edinburgh, November, December, January; in London, January, March, February, December, May; in Paris, November, October, February; in Geneva, January, March, February: and during these months we find other diseases prevail most whose characteristic is depravation of the blood.

2. The two epidemic diseases which most commonly prevail at the same time, and under somewhat similar circumstances, are erysipelas and typhus fever, especially the former, whose presence in surgical hospitals is always indicative of impending puerperal fever. Some have gone further, and expressed their opinion of these diseases being so far identical, as that infection from either erysipelas or typhus fever may give rise to puerperal fever. Mr. Nunnelly, in his work On Erysipelas, considers the two diseases to be identical, prevailing during the same atmospheric conditions, exhibiting the same general symptoms, and each capable of reproducing the other. Dr. Hutchinson and others have seen both puerperal fever and erysipelas in the same patient at the same time, and I have noticed that the infants of women attacked by puerperal fever are very liable to erysipelas or diffuse inflammation. It is also beyond question, that infection carried from a patient suffering from erysipelas to a lying-in woman, may in her give rise to puerperal fever. I am not, however, about to contend for the identity of these two diseases, but merely to point out the great probability that the essential feature of erysipelas is a morbid alteration of the blood, or, in the words of Mr. Nunnelly, that "it is highly probable, if not certain, that there is some change produced in the state of the blood, which change may depend upon alterations we are unable at present to appreciate, but which is likely to occur in many tissues, and may thus affect the mass of the blood, more or less quickly, and to a greater or less extent, according to the influence they have upon, and the connection they have with, the blood in a state of health."[1]

As to typhus fever, there is evidence on record that women in childbed, exposed to the contagion of typhus, have exhibited all the symptoms of puerperal fever. The late Dr. Labatt mentioned to me that he had known a patient laboring under typhus fever, and brought into the lying-in hospital, originate puerperal fever in patients in the same ward, who had recently been confined. And Dr. Collins mentions a similar instance. No doubt exists at present, I believe, that in typhus fever the state of the blood is much deteriorated, and that this constitutes a most important, if not essential, character of the disease. As bearing upon the present question, I may quote the following passage from Dr. Ormerod:[2] "Besides the sudden increase, under such circumstances, of the number of patients suffering from fever, there is observed in all epidemics, from the plague of Athens downwards, a tendency of all diseases to assume, as far as may be, the epidemic type. Much, probably, of this is explicable on the supposition of the existence of the same atmospheric condition affecting all who cannot resist it, in the same way; but however this may be, as far as general impressions in the absence of notes will justify the assertion, simultaneous with the occurrence of fever in the medical wards, phlebitis and troublesome sores are more commonly met with in the surgical wards of this hospital, and erysipelas of the head and face in both." Much more evidence of a similar kind might be adduced, but this is sufficient for my purpose.

3. Dr. Simpson[3] has adduced the analogy between certain forms of puerperal fever and the secondary fever which occurs after great surgical operations, and which there can be little doubt is owing to the absorption of mor-

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[1] On Erysipelas, p. 72.

[2] On Continued Fever, p. 168.

[3] Med. Times and Gazette, April 28, 1859, et seq.

bid matter. This very closely agrees with the conclusions expressed by Dr. Ferguson, as follows: "1, the phenomena of puerperal fever originate in a vitiation of the fluids; 2, the causes which are capable of vitiating the fluids are particularly rife after childbirth; and 3, the various forms of puerperal fever depend upon this one cause, and may readily be deduced from it;"[1] and he quotes in confirmation the analogy drawn by Cruveilhier between the surface of the uterus and an amputated stump.[2]

785. Thus then we find that the same seasons give rise to erysipelas, typhus fever, and puerperal fever; that they prevail epidemically at the same time; and as an epidemic take on the same type, and appear capable, the one of giving rise to the other, or of co-existing in the same patient. Further, that the symptoms of certain forms at least of puerperal fever are similar to those which occur after great surgical operations, and that the secondary lesions are similar. Now, in erysipelas, typhus fever, and the secondary fever after operations, there can be little doubt of the depraved condition of the blood, and it is highly probable that their low typhoid character is owing to this blood-poisoning. I think, therefore, that the conclusion, that the peculiar character and malignancy of certain epidemics of puerperal fever also depend upon a morbid condition of the blood, however produced, in addition to the local disease, is inevitable."[3]

Unfortunately we have but little direct evidence of the state of the blood in puerperal fever. Dr. Arnott's researches have disproved John Hunter's opinion, that phlebitis destroyed life by an extension of the inflammation to the heart; and with other investigations have shown that it is owing probably to deterioration of the blood. M. Bouillaud, in 1825, attributed the typhoid symptoms in phlebitis to a mixture of pus with the blood; and he adduces the experiments of Baglivi, Magendie, and Gaspard, as confirming his opinion, they having produced similar results by the injection of putrid matter into the system. We know from the observations of Dance, Tonnellè, Duplay, Lee, and many others, as well as from our own observations, that pus is found in the uterine veins in considerable quantity in some forms of puerperal fever, and we find that the symptoms described as characteristic of irritative phlebitis closely resemble those of puerperal fever.

Mr. Moore states that he "has seen a black precipitate in the blood of a person laboring under the adynamic form of the disease. Such a deposit is often found in typhus and in the last stage of infectious erysipelas and phlebitis. Another similarity between the blood in this affection and in other diseases of a typhoid and malignant character, is the peculiarly offensive odor occasionally arising from it."[4]

In the epidemic which occurred in 1845, in Paris, and which presented the symptoms of low typhus, MM. Bidault and Arnold state that the blood was dark and semi-coagulated, as in low typhus fever.[5] And in the epidemic which occurred at Grätz in the same year, Dr. Schoeller mentions that the blood was very fluid, and exhaled a peculiar bat-like odor; in other respects it resembled the blood of persons poisoned by Prussic acid.[6]

Dr. Scanzoni has recently maintained that the special causes of puerperal fever originate in the altered condition of the blood, and consist mainly in the presence of pus.[7]

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[1] On Puerperal Fever, p. 53.

[2] Anat. Path., Liv. 18.

[3] For further details, I refer the reader to a review in the Brit. and For. Med.-Chir Review for October. 1855, to Dr. Murphy's paper in the Dublin Quarterly Journal, Aug 1857, Dr. Fordyce Barker's able paper, read before the New York Academy of Medicine, and to Dr. Simpson's valuable lectures in the Med. Times and Gazette, beginning April 23, 1859.

[4] On Puerperal Fever. p. 183.

[5] Gazette Médicale, Aug. 1845.

[6] Med. Jahrbuch. der K. K. Oester. Staats, Oct. 1845.

[7] Ranking's Abstract, vol. vii. p. 335.

In a case of puerperal peritonitis, on the evening of the second day, Dr. Simon found that the blood formed a tolerably firm clot, and was covered with a buffy coat of an inch and a half thick; the chemical analysis furnished similar results to those obtained by MM. Andral and Gavarret.

In cases of metro-peritonitis, quoted by Dr. Day, from the analysis of Scherer, Haller, Becquerel, and Rodier, the blood presented an increase of fibrin, and a great diminution of blood corpuscles.

Dr. Copland states that he is not acquainted with any analysis of the blood in the most malignant form of puerperal fever, except that which Dr. Day quotes from Haller, who states that the blood was of a very dark-brown color. The clot was dark, of a loose consistence, and covered by a buffy coat, over which was a delicate membrane, which presented under the microscope a firmly granulated appearance and fat vesicles. The serum was turbid, but after standing for some time it became clear; its reaction was alkaline; its specific gravity 10·25. The fibrin was 5·16; the blood corpuscles 77·52. According to Becquerel and Rodier, the cholesterin and phosphates are increased.

Although the evidence I have now adduced may not be sufficient to *prove* that purulent depravation of the blood is the sole or essential cause of malignant puerperal fever, I think it affords ground for believing that the general element which constitutes the difference between this form of puerperal fever and simple inflammation of the uterus and peritoneum, may consist in some form of deterioration of the blood, depending either upon atmospheric malaria from without or absorption of some noxious matter generated within the body. At all events, I cannot but agree with Mr. Moore, that "in puerperal fever, typhus, cholera, and other epidemic and contagious diseases belonging to the class *neuroses*, there is, besides inflammatory action, another element unknown, but which has an essential influence upon the intercurrent phlegmasiæ arising in their course, and which may yield at one point only to appear at another."[1]

786. Various *causes* have been assigned for the production of this disease: it has been attributed to difficult labor,[2] to uterine inflammation,[3] to an accumulation of noxious humors,[4] to violent mental emotions, stimulants, and obstructed perspiration;[5] to miasmata; to admission of cold air to the body and into the uterus; to hurried circulation; to suppression of the milk; to diarrhœa;[6] to putrid contagion from alteration in the fluids during pregnancy;[7] to hasty separation of the placenta; to too tight application of the binder;[8] to sedentary employment; to stimulating or spare diet; to fashionable dissipation; to retained portions of placenta; to floodings from non-contraction, according to Mr. Skey; from violence but not from want of contraction, according to Dr. Armstrong; to inflammation of the intestines and omentum, from the pressure of the gravid uterus;[9] to atmospheric derangement; to erysipelas, metritis or phlebitis, and to contagion of a specific kind.

A word or two upon some of these supposed causes may not be out of place. I do not think we can fairly regard difficult labor as a direct cause,[10] although the condition in which the woman is left may render her more obnoxious to the epidemic. Primiparæ certainly seem somewhat more liable to be attacked,[1] and also patients who at the time of labor are in a weak, reduced state.[2]

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[1] On Puerperal Fever, p. 126.

[2] Of 1116 cases in the Dublin Lying-in Hospital in 1819–20, 68 were first labors; but they were not remarkably tedious.

[3] F. Plater, Prax. Med., 1686, vol ii. chap. xii. Hoffman, 1734, vol. iv. part i. Burton, 1751, Essay on Midwifery, part iv. Smellie, Tissot, Kirkland, Denman, etc.

[4] Sennert, Opera, vol. ii. part ii.: Ulcers, b. ii. ch v.

[5] F. Cooper, 1766, Comp. of Med., part iii. sect. iii. Leake, vol. ii. part xxxiii.

[6] R. W. Johnson, 1769, New System of Midwifery, part iv. chap. vii.

[7] J. Miller, 1770, Obs. of Prevailing Diseases, part iii. ch. ii.

[8] Manning on Female Diseases, ch. xx.

[9] Dr. Hulme on Puerperal Fever, p. 147.

[10] Armstrong on Puerperal Fever, p. 2.

[We have had repeated opportunities of studying epidemic puerperal fever. To each visitation of the disease in Philadelphia and its suburbs, witnessed by us, the same remarks are applicable as were made in the account we rendered to the College of Physicians, of the very fatal and extensive epidemic which prevailed in Philadelphia during the spring of 1840. Namely: that the disease occurred alike in the young and middle aged, the robust and delicate, in those surrounded by every comfort and afforded every attention demanded by their situation, as in the poor and destitute; as well in those confined for the first time, as in those who had already borne a number of children; and as well after the most rapid and easy labors, as after those that were protracted and difficult.[3]]

Mental emotion may undoubtedly be considered an effective predisposing cause. Under its influence females are peculiarly exposed to puerperal fever, and less able to bear it; thus it has been remarked, that unmarried women are often victims.[4] Several of the worst cases I have seen were mainly attributable to this cause. Cold may fairly be admitted into the list of causes. Portions of placenta remaining in the uterus, and putrefying, may, I believe, give rise to puerperal phlebitis, although this is by no means invariably the case.

Gastro-enteric irritation may certainly be propagated to the neighboring tissues; and cases which appeared simple at first may thus assume the character of puerperal fever, especially during an epidemic.

That hemorrhage during or after labor does not prevent puerperal fever, we have abundant proof; but that it renders a patient more liable to it, except so far as it reduces her strength, may be doubted.

To a considerable extent, as we have seen, the state of the atmosphere influences the disease; in damp, moist weather, it is much more prevalent, and less so in warm, dry weather.

Whatever that which we call epidemic influence may be, there can be no doubt that to it the majority of cases are attributable, especially the worst and most fatal.

787. Another very important question yet remains for our investigation, viz., that of the *infectious or contagious nature* of puerperal fever, particularly when it is epidemic. Of the simple cases of peritonitis or phlebitis after labor, occurring sporadically, I do not know that any one considers them contagious; but of the low malignant fever, opinions have varied considerably. Drs. Hulme, Hay, Armstrong, Dewees, Davis, Baudelocque, Tonnellè, Jacquemier, Kiwisch, Dewees, Meigs, etc., deny the contagion; Drs. Gordon, Young, Clarke, Denman, Burns, Hamilton, Blundell, Gooch, Mr. Ceely, Drs. Ramsbotham, Rigby, Lee, Copland, Channing, Holmes, etc., affirm it.

In all cases where a disease is epidemic, it is, and ever must be, a difficult matter to decide as to the extent of its infectiousness, because, in order to be exposed to either the contagion or infection, a person must also necessarily be placed in circumstances favorable to the exertion of its influence as an epidemic. But after a close and careful examination of the history of epidemics, of the cases recorded, and of the opinions of men of the greatest experience, I believe that the weight of evidence is in favor of puerperal fever being infectious and contagious, *i. e.*, that it may be communicated from a patient laboring under it to another who is in contact or close neighborhood with the affected party.

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[1] Collins' Pract. Treatise, p. 384.

[2] Dr. Jos. Clarke's Essay, Med. Comment, 1791, p. 311

[3] [Trans. College of Physicians, Philadelphia, old series, vol i. p. 51].

[4] Home, Chir. Exp., p. 83.

788. Leaving the general question of contagion from one patient to another, let us for a short space examine into the evidence in favor of the communicability of the disease by a third party from a patient laboring under it to another during or after her delivery, as this has a direct practical bearing upon the duties of medical men. The exact value of the facts on record will be better estimated by a little classification.

1. It seems impossible to doubt that contagious matter capable of exciting puerperal fever may possibly be conveyed by a third party unaffected by it; for example, in the cases on record of puerperal fever following the services of medical men and nurses who were in attendance upon erysipelas immediately before. The instances are too remarkable and too numerous to be regarded as coincidences, nor would even the prevalence of an epidemic of puerperal fever at the time invalidate our conclusions; it might certainly render the cause more influential.

2. It is the recorded opinion of Rokitansky, Semelweiss, and others, that morbid matter acquired in the dissection of subjects not dying of childbed fever may be conveyed by the dissector, and excite the disease in a patient delivered by him; and to this, among other causes, has been attributed the presence of puerperal fever in the wards of the Vienna Lying-in Hospital. A celebrated foreign practitioner attributed two outbreaks of this disease among his private patients to his having handled morbid specimens just before attending a patient in her accouchement.

3. We should, therefore, have less difficulty in believing that similar effects may be produced by those passing from the dissection of puerperal patients to the delivery of healthy ones, especially if the most rigid precautions were not observed. For instance, in the autumn of 1821, Dr. Campbell, of Edinburgh, attended the dissection of a married woman who died of the disease, after an abortion of the early months; he removed the pelvic viscera and external parts, and carried the whole in his coat pocket to the class room. The next morning, dressed in the same clothes, he assisted, with some of his pupils, at an instrumental delivery at Bridewell. This woman was seized with the same affection, and died. The same night he accompanied Dr. Orr to the delivery of a woman residing in the north back of the Canongate; she was equally unfortunate; and three other poor women shared the same fate in quick succession. In a subsequent year, 1823, he assisted at the dissection of a childbed fever case, but could not wash his hands with the care he desired; thence he went to attend two other women in labor, both of whom died of puerperal fever.

At a meeting of the College of Physicians, Philadelphia, U.S., Dr. Warrington stated that, after assisting at an autopsy of puerperal peritonitis, he was called upon to deliver three women in rapid succession. All these women were attacked with different forms of what is commonly called puerperal fever.

"Mr. Davies states that in the autumn of 1822 he met with twelve cases, while his medical friends in the neighborhood did not meet with any, or, at least, with very few. He could attribute this to no other cause than his having been present at the examination of two cases, and his having conveyed the infection to his patients, notwithstanding every precaution."

"A young surgeon, shortly after examining the body of a sporadic case that had died, delivered three women, who all died of puerperal fever."

"Mr. Ingleby states that two gentlemen, after the *post-mortem* examination of a case of this disease, went in the same dress, each respectively, to a case of midwifery. The one case was attacked in thirty hours afterwards, the other in three days. One of the same surgeons attended, in the same clothes, another female, and she was attacked on the evening of the fifth day, and afterwards died."[1]

Now with regard to cases attended immediately after the *post-mortem* dissection, there seems little room for doubt as to the exciting cause of the fever. It may have been conveyed in the clothes or on the hands of the accoucheur, but it is, at any rate, adequate to the effect, and the sequence is too simple and too close to be rejected.

4. Can we venture to say the same of the following case: Dr. Merriman mentions in the Lancet for May 2, 1840, that he was present at the examination of a case of puerperal fever at two p.m. *He took care not to touch the body.* At nine o'clock the same evening he attended a woman in labor; she was so nearly delivered that he had scarcely anything to do. The next morning she had rigors, and died in forty-eight hours.

We do not know whether puerperal fever was epidemic at the time, but the cause suggested seems so inadequate that we should be inclined to look for some other explanation.

5. So far, then, we have seen medical men engaged in handling morbid matter, their dress and persons exposed to the effluvium from dead bodies, and passing directly to attendance upon lying-in-women; here we have a distinct, appreciable exciting cause adequate to the production of disease in healthy persons, and which may have been, and probably was, conveyed to the patients who were first attended, and in whom puerperal fever appeared. But in several instances the disease was not confined to the first women attended, but appeared in others delivered successively. How are we to explain this, and how can we explain the pertinacity with which puerperal fever seems occasionally to track the footsteps of one or two practitioners, whether at first lighted up by morbid matter derived from dissection or not? Take the following examples. Dr. Gooch mentions that "A general practitioner, in large midwifery practice, lost so many cases from puerperal fever, that he determined to deliver no more for some time, but that his partner should attend in his place. This plan was pursued for one month, during which not a case of the disease occurred in their practice. The elder practitioner being then sufficiently recovered, returned to his practice, but the first patient he attended was attacked by the disease, and died." This latter fact seems to us to prove that the disease was epidemic at the time. Similar instances have come to our own knowledge more recently.

Dr. West, of Philadelphia, states that seven females delivered by Dr. S. Jackson, in rapid succession, were all attacked with puerperal fever, and five of them died. These were the only cases that occurred in that district, for the women became alarmed, and sent for other assistance.

A physician in Boston, U.S., had the following consecutive cases: — On March 24th, April 7th, 10th, 11th, 27th, and 28th, and May 8th, seven in all, of which five died. He then left town.

Another physician writes to Dr. Holmes as follows:—"The first case was in February, 1830, during a very cold time. She was confined on the 4th, and died on the 12th. Between the 10th and 28th of this month I attended six women in labor, all of whom did well except the last, as also two who were confined March 1st and 5th. Mrs. E., confined February 28th, sickened and died March 8th. The next day, March 9th, I inspected the body, and the night after attended a lady, Mrs. G., who sickened and died on the 16th. The 10th I attended another, Mrs. B., who sickened but recovered. March 16th I went from Mrs. B.'s room to attend a Mrs. H., who sickened and died on the 21st. The 17th I inspected Mrs. G. On the 19th I went directly from Mrs. H.'s room to attend another lady, Mrs. G., who also sickened, and died on the 22d. While Mrs. B. was sick on the 15th, I went directly from her room, a few rods, and attended another woman who was not sick. Up to the 20th of the month I wore the same clothes. I now refused to attend any labor, and did not until April 21st, when, having thoroughly cleansed myself, I resumed my practice, and had no more puerperal fever. The cases were not confined to a narrow space. The two nearest were half a mile from each other, and half that distance from my residence. The others were from two to three miles apart. There were no other cases in their immediate vicinity."

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[1] Copland's Dictionary. Art. Puerperal Fever.

Dr. Ramsbotham has known the disease to spread through a particular district, or to be confined to the practice of a particular person, almost every patient being attacked by it; whilst other practitioners had not a single case; and he considers the distemper as being capable of conveyance not only in common modes, but through the dress of the attendants on the patients.

In Sunderland, 40 out of 53 cases occurred in the practice of one surgeon and his assistant.

Dr. Roberton, of Manchester, states, that between the 3d of December, 1830, and January 4th, 1831, a midwife attended 30 patients of a public charity, 16 of whom had puerperal fever, and all died. Other midwives of the same institution attended 380 women during the same time, and none suffered from it. He also mentions the case of a practitioner, who introduced the catheter for a poor woman in puerperal fever, late one evening, and attended a lady in her confinement during the same night, who was attacked with puerperal fever on the second day.

Analogous cases have been recorded by Dr. Pierson, of Salem, U. S., Dr. Peddie, and Mr. Becroft; and such examples are, doubtless, very startling, and require a careful examination, to ascertain their exact value as bearing on the question at issue; but we shall first hear what Dr. Meigs says on the other side. His first argument is from personal experience:—"I have practised midwifery for many long years. I have attended some thousands of women in labor, and passed through repeated epidemics of childbed fever, both in town and hospital. After all this experience, however, I do not upon careful reflection and self-examination, find the least reason to suppose that I have ever conveyed the disease from place to place in any single instance. Yet for many years I carefully considered whether such a transfer by a third person might be possible, and carefully read the statements of various authors to that effect. In the course of my professional life, I have made many necroscopic researches of childbed fever, but never did suspend my ministry as accoucheur on that account. Still I certainly never was the medium of its transmission. I have, in numerous instances, gone from the bedside of women dying of childbed fever, whether sporadic, or the most malignant degree epidemic, without making my patients sick. I have also endeavored to assist my brethren, when they had such cases and I had none. In a series of labors, 468 in number, and beginning with No. 1, I find that Nos. 18 and 19 were affected, and that No. 18 died with childbed fever; No. 31 was sick, but recovered; Nos. 195 and 259 were sick, but recovered; but 291 died, as did also 293. Nos. 332, 339, 435, 444, and 445 were attacked, and recovered. The above cases—viz., 18, 19, 31, 195, 259, 291, 293, 332, 339, 435, 444, 445, 455, are, in all, 13 cases in 468 labors, of which 3 died and 10 recovered. Now, if I was the medium of contagion for any one of that series of 468 confinements, why did I poison them in the ratio and order above set forth; and why did I not communicate the disease in more than 13 out of 468 cases? What became of my nebula from 31 to 195; to 259, and between 291 and 445, and so to the end, or 468? Such a table is far more easily explained by regarding the falling-out of the cases as coincidences and accidents, than as material causations, through a private pestilence."

Again, as regards the singular limitation of the disease to the practice of one person, Dr. Meigs observes: "At page 631 of my work On Obstetrics, second edition, I have related the circumstances attending the practice of a physician at Philadelphia, who, in one of our epidemic seasons, lost a considerable number of women in childbed. His patients were scattered over a great superficies of the city and districts, some of them being more than two miles from the others. At that time many women were attacked, in various parts of Philadelphia, as well as in the State of Pennsylvania; yet, so far as has come to my knowledge, no other medical gentleman happened to encounter such a great number of childbed fevers as he did. I visited, in consultation with him, some of the very worst of the cases, and touched the patients, and was as liable to imbibe or to be clothed with the effluvia from their bodies as he was; nevertheless, I did not carry poison or other cause of disease to any patient of mine; and if not I, then how should he become capable of doing so? He is a gentleman who is scrupulously careful of his personal appearance, of great experience as a practitioner, and well informed as to modern opinions on the contagion of childbed fever. Still those of you who are contagionists will say that he carried the poison from house to house, and if so, then you ought to give some *rationale* of the fact. Did he carry it on his hands? But a gentleman's hands are clean. Did he carry a nebula or halo about him? Then why not I also? If the nebula adhered to his clothing, it might as well as have adhered to mine. What will you say, young gentlemen, of the experience of my friend, Dr. D. Rutter, formerly of Philadelphia, but now of the city of Chicago, who passed through terrible scenes here, in an epidemic of childbed fever, some years ago, when he had a most extensive midwifery practice in town and country? During that sad time, I saw several fatal cases with him in consultation; and though he seemed to be tracked by the cause of the disease, to judge by the numerous attacks of it in his lying-in patients, I was not tracked by it. I took no precaution, except such as every decent man should be supposed always to take; yet I never did carry the disease from his cases to any houses where I visited lying-in women. But he was charged with being a carrier of contagion. How could he carry the cause? What was the cause? Was it some ozone that stuck to his hands or coat: Was it a nebula, a halo, or a miasm that mixed with the hairs of his head or the woollen or cotton fibres of his dress? or an exhalation from his skin, or a halitus from his lungs, like the fiery breath of Cacus? And can you say of him, as Virgil sings—

> " 'Faucibus ingentem primum, mirabile dictu
> Exomit.—*Æneid*, lib. viii. p. 252.

Come now, was not such poison more sticky than birdlime, seeing that Dr. Rutter, worn out with fatigue, and wounded in spirit by his cares for the unfortunate victims of an epidemic disease, left the city for the purpose of gaining some strength, and to escape from the repetition of such disheartening labors, and that even a quarantine could not liberate him from this poisoned cloud? One might hope it would have been blown away by the wind, or that it would have evaporated or become too dilute to kill, after a ride of seventy miles, and an absence of ten days. But it happened, after this rustication of ten days at a distance of thirty-five miles from the city, that your birdlime or cloud still adhered to him, as your contagionists would say. And more than that, he could not even wash it away or shave it off; for upon coming back to the city, and to his professional toil, before he engaged in practice again, he caused his head to be closely shaved; he entered a warm bath and washed himself clean; he procured *a new wig*, *new clothes, new hat, new gloves and new boots.* He did not *touch* anything he had worn, and took the precaution to leave his pencil at home, and his watch. Well, what do you think happened next? He went out to attend a lady in labor, who had a favorable parturition, yet was next day assailed by a horrible childbed fever, of which she died in spite of all his efforts, and mine to help him; for he called me in in consultation immediately after being summoned himself to her chamber. I know that that lady died with peritonitis. I was a great deal with her in her illness, but she did not poison me or my clothes; for although I went on with my practice, I poisoned nobody, and made nobody have even so much as a finger-ache. Dr. Rutter repeated this attempt at personal disinfection at a subsequent period, which was two years later, and with the same ill-success. The gentleman was much and disparagingly spoken of on account of the above mentioned events in his practice, which I cannot but regard as both cruel and unjust, particularly as his success in the treatment was most brilliant; for during the epidemic he had charge of seventy cases, of which he lost only eighteen, and I know not the man who can boast of a higher triumph of his art of healing in this malady."[1]

789. Let us now look a little closer into this matter. The broad fact apparently established by the foregoing observations is, that puerperal fever does sometimes prevail chiefly, or is altogether limited, to the patients of certain practitioners, and the question arises, To what is this owing? The question is *not*, whether contagion is the only, or the chief, or the ordinary means by which the disease is propagated; for it is admitted on all hands to prevail epidemically. Nor is it the question, whether, under favoring circumstances, contagion may not be conveyed to the patient by the accoucheur, for we have related cases in which it seems impossible to doubt that this took place. We must therefore eliminate from the foregoing examples the case of the physician who wrote to Dr. Holmes, because, having made *post-mortem* examinations, his experience may rather be referred to section 3. In most of the instances, we are not told whether the practitioners examined the bodies after death; if they did, we cannot deny that there was a possibility that they might have carried the infection.

Again, if, as Dr. Rigby remarks, "the discharges from a patient in puerperal fever are highly contagious," it is at least possible that the case of the midwife mentioned by Dr. Roberton may be thus explained, inasmuch as her duties about her patients would necessitate more or less contact with the excretions.

Excluding these classes of cases, evidence enough remains to show that the fever does sometimes follow in the track of particular accoucheurs; and the real question before us is, whether it does so by contagion conveyed by him from other patients, in spite of the ordinary precautions, or in certain cases, notwithstanding the extraordinary precautions of baths, change of air, change of clothes, etc., or whether in such cases the prevalence of an epidemic of puerperal fever is a sufficient explanation, admitting it to exhibit caprices similar to other epidemics. It is impossible to bring the matter to a demonstration either way, difficulties meet us upon either supposition, and perhaps the best plan to adopt will be for us to weigh these difficulties separately.

Against the explanation which attributes, with Dr. Meigs, all to epidemic influence, is the fact of its greater prevalence in the practice of certain medical men, and its being in some cases apparently limited to them. That one man should see more cases than another of any epidemic disorder is common enough, and would be no difficulty in the present case; but that one should see all, and others none, does seem rather startling. But is the proof of the latter sufficiently conclusive and sufficiently extensive? Dr. Gooch does not tell us whether the disease was epidemic or not, nor does Dr. West. [The cases referred to by Dr. West occurred in the practice of Dr. S. Jackson, at Northumberland, Pa., and they formed the entire extent of the disease in that neighborhood, at the period of their occurrence, and for several years before and subsequently.] The gentleman who wrote to Dr. Holmes states that no other cases occurred in the vicinity, but we have rejected his example as being one of *possible* contagion on the ground of his *post-mortem* examinations. In Sunderland there were at least thirteen cases which occurred in the practice of others, besides the surgeon and his assistants. The two examples related by Dr. Meigs occurred during epidemics. So that it must be confessed that the evidence we possess to show the insufficiency of epidemic influence as an explanation, and the necessity of finding some other cause for its greater prevalence in a particular direction, is neither extensive nor positive.

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[1] On Childbed Fever, p. 102.

The explanation which attributes this peculiarity to contagion, has the merit of being simple and apparently adequate, but the difficulties on examination are more numerous and fully as great. Assuming for a moment that the disease can be only communicated during labor, let us recall to our readers what takes place during an ordinary visit to a patient in puerperal fever, during which time the infection is to be taken. The visit may occupy five or ten minutes, the physician stands by the bed, feels the pulse, examines the abdomen, but does not come in contact with the discharges. Having made his investigations, he washes his hands carefully, and then pays more visits, passing through the air, until evening, or until he is called to a labor. If many hours elapse, he must have washed his hands several times. Yet, in spite of all this, we are to suppose that he carries morbid matter on his hands or clothes, acquired from the fever patient, enough to poison the lying-in woman. And not only this, but the explanation is supposed to be equally valid even though he change his clothes, thus limiting the infection to the hands, and even though he use chloride of lime or potash.

If the morbid matter be conveyed on the hands, the infection, we suppose — and such seems to be the general opinion — must be imparted during labor; but if on the person or clothes, the effect might of course be produced subsequently, and hence another difficulty. During the visit, the consulting physician is as close to the fever patient, examines her, handles her quite as much at the visit as her ordinary attendant, and, it may be assumed, adopts afterwards much the same precautions. Yet we do not hear of his conveying the fever to his own patients in any case, and we have Dr. Meigs's positive statement that such an occurrence never took place in his practice. The advocates of contagion should explain this.

Again, in all contagious diseases the intensity of the contagion imparted to, and conveyed by, a healthy person (as in scarlatina, for example) must surely be in proportion to the shortness of the time which elapses between his visit to the sick person and to the party to whom he conveys it; in other words, that his chance of so conveying it would diminish with the lapse of time. For example, an accoucheur visits a patient in puerperal fever, suppose, and acquires this contagious property; if this rule be true, the first patient he attends will be more liable to take the disease than the second, and the second than the third. How then explain the fact, on the principle of contagion, that no such sequence of attacks is observed? the cases affected observe no such order, as the reader will see by turning back to Dr. Meigs's registry.

Moreover, in two of the most striking cases we have quoted, Dr. Gooch's and Dr. Rutter's there is a circumstance which is not reconcilable with, or explicable by, the doctrine of contagion, as we understand it. In the one case a month, and in the other ten days, of absence elapsed, and the latter was accompanied by a complete renewal of clothing, and yet the first case attended by both was attacked by puerperal fever. Are we to attribute this to remaining contagion, and, if not, does it not point directly to some other influence which may have operated previously as well?

Thus, a belief in the contagiousness of puerperal fever under ordinary circumstances, and excluding the cases in sections 1, 2, and 3, must involve, on the one hand, the conclusion that it is of all contagious disorders the most virulently contagious, inasmuch as it assumes that it can be conveyed by a healthy person exposed for a few moments only to its influence, to a third party hitherto in health, and this notwithstanding that the hands, the only part in contact with the sick person, have been carefully washed, the clothes changed, and the entire person exposed to the air, it may be for hours; and yet on the other hand, that this contagious property limits itself to the ordinary attendant, and does not affect the consulting physician. Admitting that we can not fully and satisfactorily explain the limitation of the disease on the supposition of epidemic influence only, I ask the reader whether the difficulties attendant upon the explanation by contagion are not more insuperable?

In conclusion, therefore, whilst I feel compelled by the evidence on record to admit the possibility of puerperal fever being conveyed and communicated or excited by those who attend midwifery cases after being employed in dissection or *post-mortem* examinations, and also by those who are much in contact with the fever patient or the discharges, especially if strict precautions are not adopted as to cleanliness and change of dress; I do not feel that in other cases, where no such conditions exist, that the evidence at all justifies our attributing the spread of the disease to contagion, and I think fewer difficulties and contradictions are incurred by attributing its extension to epidemic influence, and its limitation to conditions or circumstances of which we are at present ignorant.

Convinced ourselves from personal observation, that contagion or infection is one, at least, of the means to which the propagation of puerperal fever is to be referred, we nevertheless admit that there are a number of facts—chiefly however of a negative character—which it is very difficult to reconcile with the contagiousness of either of the forms of the disease. One of the strongest evidences in favor of its contagious or infectious character, as Dr. Tyler Smith very correctly remarks, is that the only successful efforts to reduce the mortality from puerperal fever, have been those directed to the removal of infection and contagion. In the course of a few years the mortality in the great hospital at Vienna, from this affection, was reduced from 1 in 10, to 1 in 74 of the women delivered, by the enforcement of measures to prevent the inoculation and injection of the puerperal patients.

790. Now, what are the precautions which ought to be taken by persons who practise this branch of the profession? We have seen that in all probability the contagion if at all conveyed, is so either by the clothes or the hands of the practitioner, from a patient laboring under the disease, or from the dead body. I would suggest the following:—1. That when engaged in close attendance upon a patient laboring under puerperal fever, the medical attendant should, if possible, procure a substitute to attend any new case of labor; but if he cannot, then, 2. He should, before such attendance, change every portion of his dress, and wash his hands in a solution of chlorate of lime, as well as in soap and water. 3. Dr. Semelweiss' suggestion of paring the nails close, is worth adopting, as particles of morbid matter may easily be concealed underneath, and applied to the mucous membrane of the vagina. 4. At the termination of each visit to a [illegible]

in puerperal fever (or in any infectious disease), the hands should be carefully washed with soap and water before leaving the room, and his clothes repeatedly changed and well aired. 5. That if a medical man have patients in childbed, one of whom should be attacked by puerperal fever, his daily visit should be first paid to the other patients and afterwards to the puerperal case, if the distance permit of his so doing. 6. It will be wiser for any one engaged in midwifery practice to procure an assistant to make *post-mortem* examinations for him; and if he be present, he ought not to wear the same dress in attending obstetric cases until it have been well aired. If the autopsy be made by himself, extraordinary precautions should be taken as to repeated ablution, with solution of chlorate of lime, etc.; and a complete change of dress; or perhaps, as Dr. Copland suggests, he ought to allow some days to elapse before attending obstetric cases. 7. These remarks apply to all autopsies, no matter of what disease the subject died, although they are more stringent in cases of death from puerperal; and also to attendance upon and dressing cases of erysipelas, diffuse inflammation, etc.

791. In treating of puerperal fever, various arrangements or classifications have been adopted to include the different forms of the disease. Thus Dr. Douglas describes three forms:—

1. The inflammatory.
2. The gastro-bilious.
3. The epidemic or contagious (typhoid).

M. Tonnellè:—

1. The inflammatory.
2. The adynamic.
3. The ataxic (irregular or nervous).

M. Martens:—

1. The inflammatory (where one organ only is affected).
2. The nervous (beginning with delirium).
3. The putrid.

M. Vigarous:—

1. Gastro-bilious.
2. Putrid bilious.
3. Pituitous (vomiting of pituitous matter).
4. Hysteritis (phlogistic).
5. Sporadic (arising from cold).

M. Gardien:—

1. Angiotemic fever, strictly inflammatory.
2. Adeno-meningic; slow, insidious fever, slimy tongue.
3. Meningo-gastric; bilious derangement, yellow skin, etc.
4. Adynamic.
5. Ataxic, or nervous.
6. Fever, with local phlegmasiæ.

Dr. Gooch:—

1. Inflammatory.
2. Typhoid.

Dr. Blundell:—

1. The mild epidemic, with little peritonitic tendency.
2. Malignant epidemic, with great pain.
3. Sporadic; peritonitis, limited.

Dr. John Clarke:—

1. Inflammation of the uterus and ovaria.

2. Inflammation of the peritoneum.
3. Inflammation of the uterus, fallopian tubes, or peritoneum, connected with inflammatory affection of the system.
4. Low fever, connected with affection of the abdomen, which is sometimes epidemic.

Dr. Robert Lee:—

1. Inflammation of the uterus, peritoneum, and peritoneal sac.
2. Inflammation of the uterine appendages, ovaria, fallopian tubes, and broad ligaments.
3. Inflammation of the mucous and muscular, or proper tissues of the uterus.
4. Inflammation and suppuration of the absorbents and veins of the uterine organs.

Or, in other words—

1. Inflammatory puerperal fever, dependent on peritonitis.
2. Congestive, dependent on inflammation of the uterine muscular tissue.
3. Typhoid, arising from venous inflammation.

Dr. Ferguson: —

1. The peritoneal form.
2. The gastro-enteric.
3. The nervous.
4. The complicated.

Dr. Copland, in the very valuable article in his Dictionary, treats —

1. Of the inflammatory states of the puerperal fever, or inflammation — *a*, of the uterus; *b*, of the ovaria and tubes; *c*, of the peritoneum; *d*, of any two, or all of them.
2. Synochoid puerperal fever, complicated with inflammation — *a*, of the peritoneum; *b*, of the uterine veins; *c*, of the uterus and appendages.
3. Adynamic or malignant puerperal fever; *a*, simple; *b*, complicated with predominant alteration (*a*) of the blood and (*b*) of the fluids and peritoneum; (*c*) of the fluids, serous surfaces, and soft solids generally; (*d*) of the uterus, or of the uterus and appendages; (*e*) of the internal surface of the uterine vessels, substance of the uterus, etc.

792. No doubt each of these arrangements has its advantages and disadvantages, nor is it very easy to propose one free from objection. I shall take as a basis for the one I adopt, the fact, as I believe, that in nearly all cases there exists local disease, and also that malignant puerperal fever is more than a mere local affection; in fact, an essential fever. We shall first, then, treat of the local forms of puerperal fever, such as we see it when it occurs sporadically, or in certain epidemics; and then of the malignant form, which may have for its local complications any of the preceding diseases. And lastly, I shall interpolate a section on a gastro-enteric affection of childbed, which in some of its characteristics resembles an attack of puerperal fever.

The classification will then stand thus: —

1. Puerperal peritonitis.
2. " hysteritis.
3. Inflammation of the ovaries and the uterine appendages.
4. Uterine phlebitis.
5. Inflammation of the absorbents.
6. Gastro-enteric fever.
7. Malignant puerperal fever.

Or in another aspect, we may say —
1. Inflammatory fever.
2. Gastric fever.
3. Malignant fever.

I am very far from thinking this arrangement perfect; one very obvious defect, but which I see no way of remedying, is that several of the local affections which are here separated do in practice occur together. Thus, hysteritis, or ovaritis is often accompanied by peritonitis, and uterine phlebitis may occur with hysteritis, or inflammation of the absorbents. Still, however, there is a broad line of distinction in many epidemics; and I must only guard against the defect of such arrangement by stating strongly at the commencement, that I do not intend to describe the varieties as essentially and widely distinct as to symptoms, causes, and course in every epidemic; and in the course of the description endeavor to point out the coincidence and the limitations of the local affections.

It may give an idea of the comparative frequency of the local affections if I quote the experience of MM. Tonnellè and Dugès.

In 222 cases, M. Tonnellè found —
  Peritonitis in 193.
  Alterations of uterus and appendages in 197.
  Combined lesions of uterus and peritoneum in 165.
  Peritoneum alone affected in 28.
  Uterus alone in 29.
In 266 cases, according to M. Dugès —
  The uterus was affected in three-fourths;
  The ovaria in one-seventh of the cases.
  There was perforation of the stomach — 10 cases in 266.
  Inflammation of the stomach and intestines — 4 " 266.
  Pleuritis, single or double . . . 40 " 266.
  Pericarditis . . . . . 6 " 266.
  Arachnitis . . . . . . 1 " 266.
  Purulent deposit in muscles . . . 8 " 266.

I shall now proceed to consider the special forms of the disease.

793. I. INFLAMMATION OF THE PERITONEUM.—This variety of the disease was the one chiefly observed in the epidemics in London, Aberdeen, Leeds, Edinburgh, and formerly in Dublin; and it has occurred in other epidemics. It appears to affect the peritoneum covering the uterus primarily, and to extend from thence to the remaining portion of the serous membrane, involving not unfrequently the uterine appendages.

The attack may commence even before delivery, of which I had an example; but more generally from twenty hours to three days afterwards. Dr. Joseph Clarke mentions that two of his patients were ill during labor; three were attacked on the second day, one on the fourth, and one on the ninth day. In the epidemic of 1788, one was attacked four days before delivery, one on the day of delivery, eight on the second day, and three on the third.[1]

794. SYMPTOMS. — The first symptom is either sudden rigors, pain, or some variation in the pulse. Dr. Campbell has remarked that in some who were attacked early, the sinking of the pulse which takes place after delivery in ordinary cases, was absent, and its frequency rather increased. Generally speaking, the rigors are first noticed; to these succeed heat of skin, thirst,

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[1] Essays in Med. Comment., 1791, pp. 311–315.

flushed face, quickened pulse, and hurried respiration. The heat of skin, however, soon subsides, and during the course of the disease it may not exceed the natural standard. To these symptoms succeed nausea, vomiting, pain in the head, and increased sensibility of the uterus. In some cases the uterine tenderness (not amounting to pain) is contemporary with the rigors, or immediately succeeds them. Pain in the abdomen soon attracts notice. It generally commences in the hypogastrium, or in one of the iliac regions, gradually radiating over the abdomen. The pain may be slight or severe, continuous, or in paroxysms — the intermissions being more remarkable as the disease advances. After the remission, the pain shortly returns with increased violence. We are not, however, to consider the pain as pathognomonic of the disease, for we sometimes see abdominal pain resembling that in puerperal peritonitis, which afterwards disappears altogether. And in certain cases of undoubted puerperal peritonitis there is no pain, or pain of slight duration. I have seen five or six cases of intense puerperal peritonitis (as shown by dissection) in which there was neither pain nor tenderness.

Dr. Ferguson has carefully estimated the frequency of this symptom, and he has found that

The number	of his patients	who had no pain was . .			19
"	"	who had pain for	1	day was	51
"	"	"	2	"	48
"	"	"	3	"	22
"	"	"	4	"	18
"	"	"	5	"	6
"	"	"	7	"	5
"	"	"	8	"	4

The pain from the first is accompanied with more or less sensibility of the hypogastrium; this tenderness becomes exquisite as the inflammation extends, until at length the patient cannot bear the slightest pressure; even the weight of the bed-clothes is intolerable, and the tension and pressure of the parietes are avoided, by lying on the back, with the knees drawn up. The enlarged uterus can frequently be felt through the integuments, above the brim of the pelvis, at an early stage of the disease.[1] Shortly after the disease is established, the abdomen becomes tumid and tympanitic, and in some cases, at a more advanced stage, the presence of effusion may be detected. The air which gives rise to the tympanites may be contained either in the intestines or the peritoneal sac.

The effect of the disease upon the lochial discharge varies; in the majority of cases it continues to flow as usual; in some, the quantity is diminished; and in others it is suppressed.[2] The secretion of milk is much more uniformly influenced by the attack. If it have commenced before the incursion of the disease, it is suspended, and the mammæ become flaccid; if the disease precede, the secretion is generally prevented. It is remarkable, that a great number of the patients lose all interest in their infants, and even refuse to give them suck.

The pulse is uniformly high throughout the disease, varying from 110 to 140 in a minute, and towards the termination to 160 and upwards. It is generally small and wiry, but is liable to modifications, from treatment, and from the peculiar character of the epidemic.[3]

The tongue is generally coated with a whitish film in the centre, but red around the edges. In some few cases, it is dry and brown in the centre, with a yellowish or white fur at the edges. The thirst is considerable at the beginning and towards the termination of the disease, but much less during its height. The stomach is disturbed at a very early period, and the nausea and vomiting continue at intervals throughout the attack. At first, the matter voided is merely the contents of the stomach, mixed with mucus; afterwards bilious matter is ejected; and lastly, green, brown, and black fluids, constituting what is called the "coffee-ground vomit." Mr. Murray found this to consist chiefly of resin, together with mucus, gelatine, phosphate of lime, and muriate of soda in small proportions.[1] In many cases the irritation extends throughout the intestinal canal, and diarrhœa is the result. This, by some, has been held to be a favorable symptom, but by others as an aggravation of the disease; and certainly my own observations would rather incline me to the latter opinion. The dejections vary in character and consistence, becoming very dark and fœtid towards the termination in bad cases.

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[1] Campbell on Puerperal Fever, p. 88. Lee on Puerperal Fever, p. 21.

[2] Hey on Puerperal Fever, p. 28. Armstrong on Puerperal Fever, p. 4.

[3] Hulme on Puerperal Fever, p. 6. Campbell on Puerperal Fever, p. 35.

The urine is generally turbid or high colored, and somewhat diminished in quantity; and the patient has frequently some difficulty in voiding it. Dr. Hulme observes that "The patient at first often complains of some difficulty in making water, and discharges it in small quantities; but this usually goes off after having a stool or two. The urine, after standing for some time to settle, generally appears of a brown color, and deposits a crude sediment, half-floating, at the bottom of the glass."[2]

Throughout the course of the disease, the skin is much about the natural heat, and dry, but as a fatal termination approaches, it becomes cold and clammy.

The intellectual faculties are rarely affected. Dr. Gordon, indeed, mentions that delirium was occasionally, but rarely, observed in the epidemic he describes; but in general the patient retains her consciousness and senses until very near the end. The countenance is very much changed; the features are all drawn upwards, and expressive of great anxiety and suffering. A patch of crimson, like a hectic flush, is sometimes observed on one or both cheeks, and is an unfavorable symptom.

Such are the characteristic symptoms as laid down by those who have had most experience in the disease. Its duration will vary according to the virulence of the epidemic; some cases have terminated fatally on the first, second, or third day of the attack; others from the fifth to the tenth. Dr. Denman fixes the general termination on the eleventh day; Mr. Forster, from the fourth to the sixth day; Dr. Leake, the tenth or eleventh day; Dr. Hulme, the seventh or eighth day; Dr. Hamilton, the fifth or sixth day; Dr. Gordon, on the fifth day; Mr. Skey, within a week; and M. Bang, on the sixth day. Dr. Campbell states that the greater number of his patients died on the fifth day; one died on the first; three on the second; three on the third; four on the fourth; seven on the fifth; one on the sixth; two on the seventh; and one on the eighth day;[3] Dr. Blundell says that it may destroy the patient within twenty-four hours from the commencement of the disease, or that "three or four days, not to say five or six, may be the average duration of the affection."[4] Dr. Collins thus gives the result of his experience: "In fifty-six deaths in the hospital, it proved fatal at the following periods from the date of the seizure, viz., two in twenty-four hours; one in twenty-seven; one in thirty-six; nine on the second day; fifteen on the third; thirteen on the fourth; four on the fifth; five on the sixth; three on the seventh; two on the eighth; and one on the eleventh day."[5]

795. MORBID ANATOMY.—The peritoneum may, in some few cases, exhibit no signs of inflammation; but generally it is found more or less vas-

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[1] Campbell on Puerperal Fever, p. 181.
[2] On Puerperal Fever, p. 9.
[3] Ibid., p. 50.
[4] Obstetricy, p. 74.
[5] Pract. Treatise on Mid., p. 374.

cular, especially that portion of it covering the uterus. Dr. R. Lee has given it as his experience, that "puerperal peritonitis commences in the peritoneal covering of the uterus, and extends from thence with greater or less rapidity, according to the severity of the attack, to the whole peritoneum. In some cases the inflammation is confined to the uterus, and it is generally most severe in this situation, or in the parts immediately surrounding that organ; even when it has extended to the other viscera, and affected them most severely, the peritoneum of the uterus invariably exhibits signs of recent inflammation. The lymph is, for the most part, thrown out in thicker masses upon the uterus than in any other situation; and this viscus seems always to suffer in the greatest degree. In the cellular membrane, under the peritoneum, serum and pus are also not unfrequently found deposited. The cellular tissue also, which surrounds the vessels of the uterus where they enter and quit the organ, not unfrequently contains some serous or purulent fluid, and the same appearance has been observed in the cellular membrane connecting together the muscular fibres."[1]

Dr. Collins states, that "in thirty-seven of the fifty-six women who died, the following *post-mortem* appearances were discovered:—the abdomen being ostensibly the seat of the disease, the morbid appearances were chiefly found there; however in *seven* we observed fluid effused into the thoracic cavities, similar in appearance to that met with in the abdomen. Effusion of fluid, though differing in character and quantity, was invariably found to have taken place. In *twelve* it seemed to be serum of a straw color; in *eighteen*, it was sero-purulent, something of the consistence of thick cream; and in *seven* it appeared bloody-serum, with quite a glutinous feel when rubbed between the finger and thumb. In these latter cases, which rapidly proved fatal, there was no lymph whatever found; whereas, in the other varieties, it was usually found deposited in large quantities, particularly in the vicinity of the uterus, but often over the entire surface of the intestines and abdominal serous membrane. In almost every body examined, the peritoneum exhibited great increase of vascularity; nor could we discover in any instance that the inflammation seemed to penetrate deeper than this membrane. The uterus, in a great majority of cases, was quite natural in appearance; in some, it was soft and flabby; and in a few, unhealthy matter was found in its sinuses. The ovaries, in numerous instances, had suffered much in structure from the effects of inflammation; being generally much enlarged, and so softened in texture as to be broken in pieces by the least pressure."[2]

Thus we find vascularity of the peritoneum and thickening somewhat in proportion to the duration of the disease, a layer of lymph covering the intestines and omentum, and agglutinating them together, effusion of serum, etc., to be the most general effects of this disease. These appearances may be limited to the uterus and pelvic viscera, or they may embrace the entire abdomen; in some rare cases they appear almost confined to the omentum.

The quantity of serum with flocculi of lymph floating in it varies considerably, and I think somewhat in proportion to the duration of the disease. In those cases which rapidly prove fatal, we more frequently find the organs covered with a layer of semi-fluid lymph; but in more prolonged cases, in addition, we find more or less effusion. It does not vary in chemical composition from that in ordinary peritonitis. It may be clear or turbid, of a yellowish white color, with shreds of lymph in it, resembling very much the whey produced in making cheese. In some rare cases blood is found in the peritoneal sac, either alone or mixed with the serosity. Puriform matter is also frequently found, especially in the pelvis, around and behind the uterus, where the inflammation has apparently been most intense. It is sometimes contained in a cyst, which is apparently a concretion of the outer surface of the pus.

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[1] More Important Diseases of Women, p. 24.

[2] Pract. Treatise on Mid., p. 398.

But the effusion of serum or pus may not be confined to the free surface of the serous membrane merely, but may occur beneath it. In an epidemic which prevailed in Dublin, Dr. Sam. Cusack states that "Two kinds of effusion were met with in the cells of those tissues (sub-serous and pelvic cellular tissue), one a reddish serum, occasionally so copious as to pervade not only the cellular tissue about the uterus, the pelvic cavity, and the iliac regions, but even sometimes to distend the cells of the delicate cellular tissue which connects together the two layers of the mesentery. The other species of effusion is not of so fluid a nature, resembling jelly in appearance and consistence. This also occupies the cellular tissue, and is most conspicuous where the looseness of the peritoneum admits of free effusion. Thus the lax nature of the cellular tissue connecting the layers of the peritoneum, which form the broad ligaments of the uterus, admits of its being poured out in considerable quantities in that situation."[1]

796. Diagnosis.—1. *From after-pains, or hysteralgia.*—These affections occur soon after delivery, and diminish or disappear by the third or fourth day—about the period when puerperal fever commences. After-pains are accompanied by a perceptible contraction of the uterus, which is absent in puerperal fever. The pulse is sometimes accelerated by after-pains, but is seldom steady in its frequency; in puerperal peritonitis it never falls below its frequency at first, but generally increases. The hypogastric tenderness in after-pains is not great, except during a pain, and it goes on decreasing; whilst in puerperal peritonitis it rapidly increases. The constitutional disturbance is incomparably greater in puerperal peritonitis, and it augments every day; whilst in hysteralgia it diminishes. The sedative, which generally relieves after-pains, has little or no influence upon the pain in puerperal fever. Notwithstanding these distinctions, there are undoubtedly many cases in which the diagnosis is by no means easy at first; and our treatment should be arranged so as to err (if we be in error) on the safe side.

2. *From intestinal irritation.*—This affection frequently assumes many of the characteristics of puerperal fever. There are, however, several points of difference. It is generally accompanied by marked evidences of gastric and intestinal disorder. The tongue is loaded, there is flatulence, nausea, and vomiting, constipation, or diarrhœa. The abdominal pain is diffused, and does not radiate from the uterus, as in puerperal peritonitis; neither is the uterus enlarged, nor tender. The abdomen may be enlarged and tense, if there be much secretion of air; but percussion will at once distinguish it from enlargement by the effusion of serum: it is rarely very tender on pressure, and gentle friction affords relief. It may occur at any period after delivery, and at first may occasion some anxiety from the resemblance of the symptoms to those of puerperal fever; but twenty-four hours will generally clear up the difficulty; the pulse falls, the milk is secreted, the lochia are not unhealthy, and the pain and distress are relieved by medicines. A little inquiry will generally elicit the fact that the bowels had been neglected previous to delivery.[2]

3. *From ephemeral fever, or weid.*—The commencement of ephemeral fever may excite some alarm, from its resemblance to puerperal fever; but its duration is shorter, its decline rapid, and its constitutional symptoms less severe. There is also far less abdominal irritation, and the breasts continue distended.[3]

4. *From hysteritis.*—The main distinction is the character and situation

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[1] Edinb. Med. and Surg. Journal, No. 98.

[2] Lee on Diseases of Women, p. 22.

[3] Armstrong on Puerperal Fever, p. 22.

of the tenderness: in puerperal peritonitis, the slightest touch on the abdominal parietes causes acute torture; whereas, in hysteritis, the patient can bear pressure very well, until we can feel the enlarged uterus. Any increase of pressure, after the abdominal parietes are in contact with the uterus, gives acute pain.[1] The symptoms of hysteritis are also more local.

797. PROGNOSIS.—The general prognosis is unfavorable, even in sporadic cases, but still more so when the disease is epidemic.

Dr. Hulme declares it to be as bad as the plague.

Dr. Leake lost	13	cases out of	19
Dr. W. Hunter	31	"	32
Dr. Clarke	21	"	28
Dr. Gordon	28	"	77
Dr. Campbell	22	"	79
Dr. Armstrong	4	"	44
Dr. Lee	40	"	100
Dr. Collins	56	"	88
Dr. Ferguson	68	"	205

In the epidemic in Paris (1746), in Edinburgh (1773), and in Vienna (1795), none recovered.

Mr. Hey observes, "For some time after the commencement of this fatal malady, it proved fatal in every case that came within my knowledge; and though a few patients recovered under the treatment which my father and I had formerly found successful with puerperal fever, yet the success was very small till the method hereafter described was fully adopted."[2]

Dr. Ferguson states, "If we take the results of treatment adopted in various puerperal epidemics, by various practitioners, we shall find that on a large scale one in every three will die, with all the resources which medicine at present offers. To save two out of three, then, may be termed good practice in an epidemic season."[3]

If the epidemic be as severe as some which have occurred in Dublin, it would be very successful practice to save one out of three.

798. TREATMENT.—It must be borne in mind, that when any peculiar mode of treatment is advised, the character of the epidemic is the test of its propriety. Forgetfulness of this rule has been the source of much controversy, and no slight acrimony. As Dr. John Clarke remarks, each author takes the epidemic he has witnessed as the type of all, and remorselessly condemns all treatment which does not agree with that which he has found successful. There is no question that the employment of antiphlogistic remedies, by Gordon, Hey, Armstrong, etc., was a great improvement upon the old methods, in the epidemics which they witnessed; but it is not to be taken for granted that it would have answered equally well in the previous ones. For many years past it has been found either inadmissible or injurious in the cases we have had in Dublin. The type of the disease and the state of the patient have not only prohibited the use of the lancet, but have indicated very clearly the necessity of a line of treatment very different, if not the opposite. Thus, in all cases, we must carefully appreciate the general constitution of disease and the special character of the epidemic, as well as the state of the patient, in order to decide upon the most suitable treatment, with reasonable probability of success. Moreover, in cases where bleeding is admissible, it has appeared to me that the time for its beneficial use is very limited. After the disease has lasted more than from twelve to twenty-four hours, I have seen but little benefit from bleeding; and the same observation I have

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[1] Armstrong on Puerperal Fever, p. 20.

[2] On Puerperal Fever, p. 10.

[3] Ibid., p. 112.

heard from Dr. Charles Johnson, of this city, whose opinion is most deservedly of the highest authority.

Having premised thus much, I shall describe the treatment which has ordinarily been found the most efficacious.

If the pulse be firm, a large quantity of blood is advised to be taken from the arm. Dr. Gordon recommends from 20 to 24 ounces, at the beginning, and, if necessary, this may be repeated. The blood generally exhibits the buffy coat. Dr. Ashwell considers Dr. M. Hall's method of placing the patient upright and bleeding to incipient syncope, of great value in puerperal peritonitis.[1] Should any circumstances forbid a repetition of the venesection, a number of leeches (from 60 to 100, *Campbell*) may be applied to the abdomen, and when they fall off, the abdomen should be fomented, or covered with a light bran poultice. The fomentation, or poultice, may be repeated at intervals, as it has a very soothing effect.

This practice boasts the support of very great names — Denman, Leake, Gordon, Armstrong, Hey, Campbell, Mackintosh, Jos. Clarke, MM. Dugès and Tonnellè, Blundell, Conquest, Gooch, Dewees, Lee, Meigs, etc.; but it was recommended with limitations by Kirkland, Hull, Gardien, Douglas, etc.; and in some epidemics, as I have said, it is either inadmissible or injurious. Dr. Collins remarks, that "In fifteen only of the eighty-eight did we deem it advisable to bleed generally: seven of the fifteen recovered." "I am satisfied, however, that *in hospital*, the immediate application of three or four dozen leeches, followed by the warm bath, in which the patient should remain as long as her strength will bear it, will be found in the great majority the most judicious means of removing blood."[2]

After full depletion, the next powerful remedy is *mercury*, alone or in combination with opium. Without explaining its *modus operandi*, it is sufficient to state the fact, that it has been found to exercise a remarkable influence over inflammation of serous membranes. It may be given in large doses (gr. x. every three or four hours), or in smaller ones, more frequently repeated (gr. ij. every hour); and it should be continued until an impression is made upon the disease, or until the mouth is affected, unless purging be induced. The mouth will be affected much more rapidly, and with smaller doses, if to each be added a very minute quantity of tartar emetic, say $\frac{1}{18}$th of a grain; but this will not do if there be nausea or vomiting. I am indebted to Dr. A. Smith for this suggestion. After a decided effect is produced, the dose may be diminished, and the intervals lengthened. For the purpose of preventing intestinal irritation, it is usual to combine it with Dover's powder of opium. Perhaps it is not too much to say, that the benefit of the opium in this combination is not confined to the prevention of intestinal disturbance, but that it exerts a positive and beneficial influence upon the inflammation. When the calomel acts on the bowels, it may be omitted, and the opium alone continued; and I have seen as much benefit from it alone, as from the calomel. Some years ago I saw a case of puerperal peritonitis, in consultation with a friend, and we administered large doses of opium (gr. j. every hour) with the greatest benefit. Since then, several similar cases have occurred to me. Dr. Stokes was the first to point out the value of opium in bad cases of peritonitis, where bleeding was inadmissible; and I have repeatedly verified his observations.

Mercurial frictions are a valuable mode of affecting the system, and for this purpose I would strongly recommend the Linimentum Hydrargyri of the London Pharmacopœia. But I may say of mercury as I said of bleeding, that though very efficacious in many cases, there are others in which its effects are injurious, or in which it is inefficacious.

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[1] On Parturition, p. 481.

[2] Pract. Treatise on Midwifery, pp. 391, 393.

Tartar emetic was recommended by Hulme, and used by several since his time, with apparent benefit. The state of the stomach, in many cases, however, will prevent its exhibition.

Purgatives have been warmly recommended by Hulme, Denman, Gordon, Hey, Armstrong, Chaussier, Stoll; and as strongly reprobated by Baglivi, John Clarke, Cederskiol, Thomas, Campbell. "My own experience," says Dr. Ferguson, "with regard to aperients is, that whenever they create tormina, there is the greatest risk of an attack of metro-peritonitis succeeding. This so constantly occurs, that I invariably mix some anodyne—usually Dover's powder, or hioscyamus, or hop, with the purgative." If the bowels be constipated, an enema of turpentine and castor oil will be useful. The spontaneous diarrhœa is not always beneficial, but will often need to be restrained by astringents, or opiates.

Emetics were employed before 1782 by English practitioners, and in 1782 they were recommended by Doulcet, of Paris, who relied upon them exclusively, and derived from them extraordinary success. Other practitioners have also used them successfully; but they have failed so often, as to have gone out of use, especially in these countries, perhaps in consequence of our mistaking the proper cases. M. Tonnellè states that M. Desormeaux tried them with great success in 1828, but that in the next year they generally failed. In September, 1829, they succeeded, but in October and November they failed. They did not, however, appear to produce any aggravation of the symptoms. Dr. Ferguson remarks, that "The practical question, then, is, what are the cases in which the remedy is applicable? The clue has been already given, I imagine, by Doulcet himself; it is when the violence of the malady has fallen on the liver especially, and when there is early nausea and spontaneous vomiting."[1]

In the year 1814, Dr. Brennan, of Dublin, proposed the internal use of *turpentine*, which he regarded as a specific, and which in many cases was very successful. He gave it in doses of a tablespoonful at a time, in a little water, sweetened. Drs. Douglas,[2] J. A. Johnson, Dewees, Payne,[3] Kinneir, Blundell, and Waller, have found it more or less useful. Drs. Jos. Clarke, and other practitioners, tried it, but without success. Dr. Clarke observes, "In addition to the usual routine of practice, numerous trials were made with the rectified oil of turpentine, in doses from six to eight drachms; sometimes in plain water, sometimes combined with an equal quantity of castor oil. The first few doses were generally agreeable to the patient, and seemed to alleviate the pain. By a few repetitions it became extremely nauseous, and several patients declared that they would rather die than repeat the dose. In more than twenty trials of this kind, not a single patient recovered."[4] It is certainly beneficial when the intestines are tympanitic, especially in the form of enema, and as a counter-irritant to the abdomen; but I have never seen it exert any remarkable influence upon the disease.

At an advanced state of the disease, *blisters* are very useful. They may be applied to any part, or the whole of the abdomen, and dressed with mercurial ointment.

Recolin, Dance, and Tonnellè have recommended injections of warm water into the vagina and uterus, three or four times a day. Drs. Lee and Campbell have tried them in a few cases with decided advantage. I have frequently syringed the vagina with warm water with benefit; but I never threw the injections into the uterus.

Hip baths have been found useful by Desormeaux and Collins; but the pain of moving the patient is an insurmountable obstacle to their frequent use.

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[1] On Puerperal Fever, p. 204.

[2] Dublin Hosp. Reports, vol. iii.

[3] Ed. Med. and Surg. Journal, vol. xxii., p. 53.

[4] Letter to Dr. Armstrong.

Lœffler, as Ceeley of Aylesbury, have seen good effects result from the application of cold to the abdomen.

The irritation of the stomach may be allayed by effervescing draughts, containing a few drops of laudanum, or by a few grains of the subcarbonate of potash, dissolved in aq. menth. virid.

A selection of these remedies will afford a tolerably good chance to the patient, if we are called early; but in many instances we shall fail, either in cutting short the disease, or in curing it ultimately. It is of the greatest importance, however, that all the means at our command should be tried perseveringly, and that our forebodings should not be allowed to diminish our exertions.

799. II. PUERPERAL HYSTERITIS.—Inflammation affecting the proper tissue of the uterus has been frequently described. It is mentioned by Astruc, Vigarous, and Primrose. Pouteau observed it in the epidemic of 1750. Ricker and Boër have described it under the term *Putrescirung* or *Putrescenz der Gebärmutter*, and cases of it have been recorded by Smith, Danyau,[1] and Tonnellè.[2] In certain epidemics it is tolerably frequent, occurring either alone or as one among other local affections. Thus, Tonnellè, in 222 fatal cases of puerperal fever, found 79 cases of simple metritis, 29 of superficial softening, and 20 of deep softening. M. Dugès found the uterus affected in 3 cases out of 4; and Dr. R. Lee states, that in 45 dissections, the muscular coat of the womb was softened in 10 cases.

This form of the disease may be the only affection in certain cases of puerperal fever, or it may be the most prominent, though not the sole affection, or it may only be one of several forms of local disease.

800. SYMPTOMS. — These will vary somewhat, according to the character of the epidemic, and a great deal according to the severity of the attack. In the *milder form*, where the disease does not proceed so far as to disorganize the uterine tissue, I have generally found it commence on the third or fourth day, with rigors, followed by heat of skin, thirst, and headache. The pulse rises to 100 or 110; the tongue is dry and furred; the countenance expressive of suffering, but without the anxious, pinched, drawn-up character we find in puerperal peritonitis. The patient complains of uneasiness, pain and tenderness in the uterine region, and upon examination we find the uterus more or less enlarged, hard, and tender. The abdomen, at first, is soft and without any tenderness, which is first felt when we perceive that we are making pressure upon the enlarged uterus. As the disease advances, the abdomen often becomes tympanitic, and in some cases the inflammation extends to the peritoneum.

The state of the lochia is by no means uniform; in many cases they are diminished or suppressed; in others, their character is changed, and they become offensive; in other cases, again, they are quite unaltered. The secretion of milk is generally arrested. There is occasionally another symptom, which I think is more marked in hysteritis than in any other variety of puerperal fever, viz., dysuria, which causes much distress, and which may amount to retention, and this especially, as Dr. Dewees has remarked, in cases which have required instrumental aid.

The *severer form* of hysteritis, as described by Dr. R. Lee and M. Tonnellè, is ushered in by rigors, followed by increase of heat and headache. There is occasionally delirium, and other evidences of cerebral disturbance. The countenance is pallid, anxious, and disturbed; the skin, at first hot and

[1] Repertoire Gén. d'Anatomie, vol. v. p. 1.

[2] Essai sur la Métrite Gangreneuse, 1829.

dry, becomes cold, with sometimes a blue or yellowish tinge. The respiration is hurried, the pulse rapid and feeble, with great prostration of strength. The tongue soon becomes foul, and the lips and teeth covered with sordes. More or less of nausea, vomiting, and diarrhœa are generally present. The patient complains of pain at the hypogastrium, where the enlarged uterus may be felt, and which is very tender on pressure. The lochia are diminished, or altogether suppressed, and frequently they become fœtid or acrid.

This form presents a very different aspect to the former. It is quite evident, that in addition to the local affection common to both, the constitution is deeply involved, either in consequence of its previously impaired condition, or owing to some peculiarity of the epidemic, or in consequence of the local disease having produced a more rapid and profound impression on the general system.

801. Hysteritis may terminate—1. In *resolution;* as is the case with the mild variety which I have described, and in which there is a gradual subsidence of the symptoms.

2. In *abscess;* which may open into the uterine cavity, or into the peritoneal sac. I had an opportunity of seeing a case of the latter kind, some time ago, in a patient, whose case has been published by my friend, Dr. Beatty.

3. In *softening.* This termination was observed 49 times by M. Tonnellè, and 10 times by Dr. R. Lee. "Among the 222 fatal cases of puerperal fever observed by M. Tonnellè, in the Maternité, at Paris, in 1829, there were 49 in which the muscular tissue was found softened. M. Tonnellè states, that softening of the uterus, after showing itself frequently in the first half of the year 1829, and particularly about January, disappeared entirely in the months of July and August, which were characterized in a remarkable manner by the frequency of inflammation of the veins. Afterwards, it began to rage anew with great violence in September and October, and again disappeared in the last two months, during which time the mortality was inconsiderable."[1]

4. In *gangrene.* This has been described by M. Boër, in his valuable work,[2] and by Ricker,[3] and noticed by Siebold, Busch, Boivin and Dugès, Danyau, etc.

802. MORBID ANATOMY.. — The peritoneal coat of the uterus very often exhibits marks of inflammation. It may be vascular, and coated with lymph, or softened. The size of the womb is manifestly increased, and its substance soft and flabby. Small collections of purulent matter are sometimes found in its parietes, which in these spots exhibit various degrees of absorption. Boivin and Dugès observe that "Pus is sometimes found even in the substance, and generally nearer to the exterior surface than the interior; thus pus collects into distinct abscesses, from one to five inches in diameter, sometimes into a simple or multilocular deposit, with a greenish or viscous appearance; at other times it is infiltrated into the fleshy fibres, imparting to them a yellow reddish color, perceptible through the peritoneum. In this latter case tumors form, which are sometimes hard and projecting, upon the fundus uteri; at other times flattened, soft, and broad; these latter come further down towards the lateral parts, and often form a continuation, together with purulent infiltrations, between the laminæ of the broad ligaments, with the cellular tissue of the pelvis and the substance of the ligament of the ovarian vessels, frequently giving rise to those large abscesses of which we have already spoken."[4] The substance of the uterus may be, in patches, reduced to a mere pulp, of a dark purple, yellowish, or greyish color, and occasionally of a bad color. This softening generally commences

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[1] Lee on more important Diseases of Women, p. 38.

[2] Natürliche Geburtshülfe, etc., vol. i. p. 202.

[3] Siebold's Journal, vol. ii. p. 62.

[4] Boivin and Dugès, Diseases of the Uterus, etc., trans., p. 326.

at the inner membrane, and penetrates more or less through the substance of the uterus. According to Dr. Ferguson's experience, "The point of insertion of the placenta is the most ordinary seat of all uterine lesion, whether of abscess, softening, or phlebitis; the next point, the large and congested, lead-colored cervix uteri." False membranes of coagulable lymph are found on the lining membrane of the cavity, mixed with blood and lochia.

M. Tonnellè states that the disease in Paris exhibited two distinct forms, "the softening of the uterus, properly so called, and the putrescence. In the first form, the softening affected only the internal membrane of the uterus, and it presented itself under the appearance of irregular superficial patches of a red or brown color, which occupied almost all the points of this surface; its limits were not determined, the diseased tissue passing by irregular gradations or shades into the healthy tissue. In the second species the softening extended deep into the substance of the uterus. The tissue of this organ was so softened that the fingers could not seize it without passing through it in all parts. The superficial softening was combined almost always with some alteration of structure — peritonitis, metritis, or uterine phlebitis; and it did not appear to M. Tonnellè that the existence of these had a very sensible influence on the progress of the symptoms. The softening in the second degree was also sometimes combined with other disorders; but it formed usually the principal alteration, often the only one, and invariably impressed upon the disease the most decided typhoid character."[1] MM. Boivin and Dugès,[2] and M. Duplay, have noticed similar changes, and the latter author especially has accurately described the circumscribed mortification found on the internal surface of the uterus. The *cause* of this peculiar softening has been much debated, some attributing it to a specific action of the parts or to alteration of the blood, and others to inflammation; in some cases it appears to be the result of inflammation, but in others there is no evidence of previous or concurrent inflammatory action.

803. Diagnosis. — When complicated with peritonitis, the diagnosis is very difficult; but when the uterus is alone affected, it is easier to distinguish it: —

1. From *after-pains, weid*, etc., it differs very widely in its persistence, and in the gravity of the accompanying constitutional symptoms.

2. From *puerperal peritonitis*. The most marked distinction between them is the tenderness on pressure, which, when the peritoneal sac is inflamed, is general and superficial, rendering the slightest pressure intolerable; whereas, in hysteritis, the abdomen will bear pressure very well all over, *until we ourselves feel that we are pressing the enlarged and hardened uterus.* The only exception to this rule I have met with are those cases of peritonitis where there is no abdominal tenderness. The pulse in hysteritis is weaker, and the patient sinks more rapidly than in peritonitis, the lochia are more frequently fœtid, and the entire symptoms have a more marked typhoid character in the severer form.

804. Prognosis. — In the milder form many cases recover; the uterus remains hard and tender for some time, but the pain and tenderness diminish, the pulse becomes quieter, the tongue clean, the bowels regular, and the appetite returns. The preservation or reappearance of the natural character and smell in the lochia is a valuable sign, and a still better is the continuance of a good secretion of milk.

In the severer form, especially when it prevails epidemically, the prognosis is very unfavorable, almost every well-marked case proving fatal, and the patient dying with symptoms of a bad typhoid character.

805. Treatment. — The reader will bear in mind the observations I

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[1] Lee on Diseases of Women, p. 38.

[2] Diseases of the Uterus, etc., trans., p. 325.

have already made as to the modification of treatment required by the general constitution of disease at any given period, the peculiar type of the prevailing epidemic, and the state of the patient. As a general rule, I think patients bear bloodletting better in the mild form of hysteritis than in some of the other varieties, but even here I have not been able to use the lancet of late years. Venesection, however, may be necessary and proper, and the earlier in the disease we have recourse to it the better. If inadmissible from any cause, we shall, I think, always derive advantage from leeches applied over the uterus, followed by constant poultices and fomentations.

Calomel and opium are of great value when they act kindly. I have rarely seen a patient die who was fairly under their influence, but it frequently happens that diarrhœa is induced, and then we must omit the calomel, and apply mercurial frictions, with opium given internally.

When the acute stage is over, very great benefit will be derived from repeated blisters to the abdomen, and by covering it with a layer of prepared wool. The bowels must be kept free, but by the gentlest means, active purging seeming to aggravate the symptoms; and at all events it is an obstacle to the use of mercury.

No remedy that has been tried seems to have much power over the severer form when it prevails epidemically. If antiphlogistics are admissible at all, which I very much doubt, it must be in the earliest stage, but I should have more faith in counter-irritation and the liberal exhibition of tonics, such as bark, with wine, and, if necessary, opium, just as they are given in typhus fever.

806. III. INFLAMMATION OF THE UTERINE APPENDAGES.—Under this head is included inflammation of the serous membrane, and proper tissue of the ovaries, fallopian tubes, and broad ligaments. It is not always possible to separate these affections from inflammation of the peritoneal cavity, with which they are so often conjoined; but there are cases in which they exist alone, or predominate in a striking manner, or where the consequences of the disease continue longer in these parts. Puzos has described such cases by the term, "*Dépôts laiteux dans l'hypogastre,*" and Levret, as "*Engorgemens laiteux dans le bassin.*" The observations of MM. Husson and Dance likewise prove that this is a frequent, and often fatal, termination of inflammation of the peritoneal coat of the uterus and its appendages. M. Tonnellè found fifty-eight cases of inflammation of the ovary and four of abscess, out of one hundred and ninety cases of puerperal fever.

807. SYMPTOMS.—As inflammation of the uterine appendages is generally combined with more or less inflammation of the peritoneal cavity, the symptoms will present many of the characters of peritonitis, but probably in a moderate degree; and as they subside, or as the local affection becomes more developed, we shall detect mischief in the situation of these appendages. The pain is less acute and less universal than in general peritonitis: it is seated in one of the iliac fossæ or the lateral portion of the hypogastrium, from whence it may radiate to the groin and down the thigh. A careful examination will detect a degree of hardness in the part, compared with the rest of the abdomen, perhaps a definite swelling with great tenderness on pressure. Percussion, which probably yields a clear sound over the abdomen generally, gives a very dull sound over this portion.

An *internal* examination will often throw light upon the seat of the disease: the vagina will be found hot and painful at its upper part, and the tumefaction may be detected through its lateral parietes.

The disease generally commences with rigors, thirst, headache, quick pulse, etc., presenting an array of constitutional symptoms very similar to those in peritonitis, which, therefore, I need not repeat. If the disease be extensive, there is generally observed much exhaustion following the first stage, and the attack may prove quickly fatal.

Should the disease not prove fatal, the attack may terminate —

808. 1. In *resolution*, without the organs being seriously injured; or in some cases adhesions may be formed between continuous portions of the serous membrane, which, though for the present innocuous, may be injurious subsequently. Boivin and Dugès relate a case in which anteversion was caused by these adhesions. If the fallopian tubes have been involved, the cavity of one or both may be obliterated, or they may become adherent to some neighboring part, so as to prevent altogether their ordinary functions.

2. *In suppuration.* Matter may form in either ovary or broad ligament, or a more extensive pelvic abscess may be formed, including these organs and the neighboring tissue. The matter may escape into the peritoneum, and excite fatal inflammation; but this is comparatively rare, or the abscess may open into the bladder, vagina, or rectum, or make its way to the surface of the abdominal parietes. Many examples of each are on record, and I have myself seen most of them, but in my experience the opening has most frequently been into the rectum.

809. MORBID ANATOMY. — In some cases we find, on dissection, that the disease has been confined to the serous membrane, presenting similar phenomena to those already noticed — thickening, effusion of lymph or serum, etc. The broad ligaments, fallopian tubes, and ovaria, are red and vascular. The morsus diaboli is of a vivid red color, and sometimes softened, and in its cavity, or under the peritoneum, deposits of pus may be discovered. Dr. John Clarke states that "Inflammation is often observed running along the fallopian tubes, which, when cut open, will be seen loaded with blood. The ovaria, too, are often affected in the same way. Pus is often found in the cavity of the fallopian tubes, and also in the substance of the ovaria, which are in some cases distended by inflammation and matter, so as to equal in bulk a pigeon's egg."[1] Effusion of serum or purulent matter may also be found between the folds of the broad ligaments.

The ovaria may be imbedded in lymph, the product of inflammation of their serous coat. Sometimes they are swollen, red, and pulpy. One or both of these organs may be affected.[2] Dr. Gordon mentions that in his cases of puerperal, the right ovary was always diseased, and the left healthy. Upon laying open the ovaries, their structure will be found more or less diseased. There is a great increase of vascularity, and frequently a softening of their proper tissue. In a few cases it is utterly disorganized. Blood is sometimes effused into the Graafian vesicles, so as to destroy their texture. Pus may be found in small masses throughout the ovary, or that organ may be reduced to a sac full of purulent matter, which may escape in different ways, as already noticed.[3]

810. DIAGNOSIS. — The situation of the pain and tenderness, the dulness on percussion, the slight increase of hardness, and the results of an internal examination, are the only grounds of diagnosis during the earlier acute stage. If, however, the disease continue, and do not terminate in resolution, these symptoms become more marked, and we cannot easily make a mistake as to its nature and seat.

811. TREATMENT. — In some cases venesection may be necessary, but more commonly leeches to the part will be sufficient; they should be in sufficient numbers, and may be repeated if necessary. After the leeches fall off, a poultice, hot, soft, and sloppy, should be constantly applied, not merely to encourage the bleeding, but for its soothing effect upon the inflamed parts.

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[1] Essays, p. 63.

[2] Ferguson on Puerperal Fever, p. 38.

[3] Lee on Diseases of Women, p. 26.

Calomel and opium may be given to a moderate extent, if the bowels are not irritable during the acute stage. Vaginal injections of warm water, two or three times a day, and hip-baths occasionally, will be found very soothing and grateful.

If the disease persist and matter form, it must be treated in the way I shall presently describe.

812. The foregoing description applies to those cases which occur as a variety of puerperal fever, in connection, it may be, with other local affections, and during an epidemic: but inflammation and abscess may occur after delivery, independent of an epidemic, and with no other complication: nay, it may happen to married women who have had no children, and even to virgins. I hope the reader will pardon the irregularity, if, in order to complete the subject, I introduce here a brief summary of the peculiarities of the disease in its more isolated and chronic form.

As I have just observed, this species of inflammation of the uterine appendages may occur, though rarely, independently of pregnancy and labor, but far more frequently after labor, and at varying intervals; the first intimations being perceived in some cases from three to ten days after delivery, and in others not until the lapse of some weeks.

813. Causes.—It is very difficult to assign any special cause for this attack. It may follow blows, falls, or a fright; but it is more frequently the result of cold or of excessive sexual intercourse. From the coincident suppression of the milk or lochia, it has been frequently attributed to either accident, but, as I believe, without sufficient grounds. That it may occur in consequence of the long-continued pressure of the child's head in lingering labor, I do not doubt; but it is evident that this is not a frequent cause, as most of the cases I have seen occurred after natural labor. Lastly, it may be the termination of a more general acute inflammation.

814. Invasion.—The mode of invasion varies a good deal:—

1. In certain cases there are few, if any, preliminary symptoms: uneasiness, perhaps, but not amounting to pain, in one or other iliac region, and upon placing the hand on the spot, a tumor is detected.

2. Or, after a favorable convalescence for some days, just as the usual term of our attendance expires, the patient experiences a slight febrile attack, with some shooting pains in the abdomen, which subside after a time, though the fever continues without apparent cause, until, in the course of time, the local disease develops itself.

3. Again, in other cases, the attack is purely local, and its nature pretty evident; from the beginning there is pain in one or other iliac region, tenderness, and shortly after, tumefaction, with fever.

4. Lastly, the affection may at first assume the character of a more general affection of the peritoneum, the pain extending over the abdomen, occurring mainly in paroxysms, with tenderness on pressure, and fever; but by and by the general tenderness and extended pain subside, and become, as it were, localized, by which the character of the attack is made evident.

815. Symptoms.—Having thus briefly alluded to the various modes in which the disease commences, I prefer taking the symptoms separately, in order of their importance and prevalence, rather than in that of their succession.

1. The presence of tumefaction or of a distinct tumor, is invariable; it occurs in all cases, and characterizes the disease. It may be found completely above Poupart's ligament, and the linea ilio-pectinea, sometimes occupying one iliac fossa entirely, and even extending upwards as high as the umbilicus, and forwards to the linea alba; or it may be [illegible]

deeply in the pelvis, just reaching to Poupart's ligament, protruding the groin, and from its fixedness giving the impression of being firmly connected with these parts. In the former case, the tumor is larger, more defined, and far more movable: in the latter, it is rather undefined, immovable and more painful. . In both it is equally hard; in fact, as hard as a stone until suppuration commences; and equally tender on pressure. If a vaginal examination be made in the former case, we do not always discover any change; the vagina may be cool, no tumefaction may be detected, and movement of the uterus may occasion little pain. But in the latter cases, and also in the former when the inflammation is much diffused, the vagina is hot, somewhat tender, and at one of its sides, or at its upper part in the "*cul de sac*," on one side of the cervix uteri, a hard, painful swelling may be detected, which is evidently connected with the tumor in the groin, and in these cases the uterus cannot be moved without acute pain.

2. Although the period at which it may be developed varies, yet sooner or later pain is an accompaniment of the disease. It maintains, as it were, its seat in the tumor, from whence stings of pain radiate in all directions. When the tumor is high, that is, above the brim of the pelvis, the pain is more limited to the tumor; when situated in the pelvis and groin, it extends across that cavity, down to the anus, to the back, and down the thigh. In these cases it is almost always difficult, in some cases quite impossible, to straighten the thigh, so as to stand upright. Walking, too, is both difficult and painful.

3. In these latter cases, also, when the tumor occupies a portion of the pelvic cavity, we often find the patient distressed by tenesmus, and a desire to make water, the consequence, probably, of an extension of the irritation to the bladder and rectum. Occasionally, when the tumor is large, it offers a mechanical impediment to the functions of these viscera, and the patient may suffer from dysuria, or be unable to evacuate the intestinal canal.

4. The amount of fever, as well as the time of its setting in, varies. In some cases it precedes or accompanies the first local symptoms; in others, it supervenes after the tumor has been detected some time. In a few cases it is almost confined to the evening, and during the process of suppuration there are, in almost all cases, evening exacerbations. The pulse ranges from 90 to 110; the tongue is loaded, the skin hot, the thirst considerable, and the urine high colored. The appetite is always bad. These symptoms are somewhat mitigated, or at least the patient suffers less, in cases not connected with parturition.

816. TERMINATIONS.—After being fully developed, and running on even for a considerable time, the disease may terminate:

1. *In resolution.*—This most frequently occurs with cases in which the tumor is above the brim, and limited in extent; and in such, we find the pain diminishing and ultimately ceasing, the tumor first becomes less tender, then less in size, until at length it disappears. This process will occupy from one to three months.

2. *In abscess.*—When suppuration takes place we can generally feel a degree of softening, with an obscure sense of fluctuation in the tumor, either externally or internally; the patient complains of more throbbing, and occasionally of rigors, and by degrees (if not anticipated) the coverings are thinned, and the matter may escape—

a. Externally, through the abdominal parietes covering the tumor.

b. Into the vagina, through which the matter escapes.

c. Into the intestinal canal, and especially the rectum, with the evacuation of matter per stool.

d. Into the bladder.

e. Into the peritoneum, where it gives rise to peritonitis, always alarming, but not always fatal.

f. Into the surrounding cellular tissue, where it may burrow until it finds an outlet.

The matter may be evacuated by any of these "routes;" and if the opening be sufficiently large, the sac may be emptied, and the abscess fill up and heal. But if the opening be small, the discharge may continue for an indefinite length of time, the opening remaining fistulous, and the cure being proportionably difficult. I have repeatedly seen the matter evacuated by the first three ways, and I think equally frequently. I have also seen it pass into the bladder, but very rarely. I have never yet seen it evacuated into the peritoneal cavity, and I cannot but think it very rare.

3. The extent of the disease, or the secondary affections caused by it, may prove fatal after an indefinite length of time.

817. Diagnosis.—A good deal of light will be thrown upon the diagnosis, when the disease occurs within a reasonable time after parturition, and especially when the patient has suffered from abdominal pain: in such cases, if we discover a tumor in one of the iliac fossæ, with tenderness and pain, we shall have adequate grounds for diagnosticating this affection.

If, however, the attack occur independently of child-bearing, or at a considerable interval afterwards, there may be difficulty in distinguishing between it and some of the chronic organic diseases of the ovary, especially when the tumor is above the pelvic brim: our safest guide, probably, will be the amount of pain and constitutional disturbance, which is much greater in the disease I have been describing.

An ileo-cœcal abscess when situated rather lower than usual may easily be confounded with an ordinary pelvic abscess, which is the more undesirable, as if we attempt to open it we may penetrate into the intestine. I have seen one such case, and the only grounds of differential diagnosis I could make out was an unusual resonance of the tumor on percussion, which I believe never exists with pelvic abscess.

I have known this affection mistaken for sciatica; and when the tumefaction is mainly confined to the pelvis, and pressure is made upon the nerves issuing from that cavity, the pain may be limited to the track of the nerves, so as to deceive any but a careful observer. However, a minute investigation will probably enable us to trace the pain into the pelvis, and then an external, and especially an internal, examination will at once reveal the cause of the pain. The flexion of the thigh, which alone might also mislead, will of itself lead to an examination of the groin, and so to the detection of the tumor.

818. Treatment.—The indications of cure are, 1, to procure resolution of the tumefaction; or, 2, to promote suppuration and evacuation of the matter.

1. If we are called in at an early period of the attack, it is often possible to arrest its progress, as has been well remarked by Dr. Doherty; nay, even where the disease has lasted some time, as in the cases mentioned by Puzos, it is in some cases quite possible to procure resolution. For this purpose Mauriceau and the author just named, advise repeated venesection, with purgatives, alteratives, absorbents, etc. I believe that the repeated application of leeches will be found more effectual at less expense of strength. A dozen should be applied over the tumor, followed by bran poultices, and repeated if necessary, *i. e.*, if the pain and throbbing be not relieved. If we succeed in arresting the progress of the inflammation, a succession of small blisters will be of great use. Fomentations, and an occasional hip bath, also afford great relief to the patient; but still more comfort is derived from vaginal injections of warm water, twice a-day.

Internally, we may exhibit mercury in small doses, perhaps even so far as to affect the gums, though this is not generally necessary, and an occasional purgative; but my experience has led me to the conclusion that brisk purgation is not beneficial; it appears to augment the local irritation, and certainly increases the pain. If the pain prevent sleep, an opiate may be given. When the disease shows signs of retrocession, I have seen benefit derived from an application of the emplastrum hydrargyri. The diet should be nutritious, but bland and unstimulating.

2. If, however, notwithstanding the prompt and sedulous use of the means I have indicated, the disease should not yield, we may be sure that suppuration will take place, and our object will then be to promote this by poultices and fomentations, constantly applied.

The formation of matter will sometimes be indicated by rigors, but in many cases it is by the touch only that we can recognize this occurrence. I cannot too strongly impress upon my readers the advantage of making an opening into the abscess when it is posssible, and so deciding the course which the matter is to take, instead of leaving it to burrow and make an opening in some dangerous situation. The best situation for our incision, if the case admit of it, is through the abdominal parietes; the next, through the wall of the vagina. If, from the high situation of the tumor, we fear that, when opened, the matter may escape into the peritoneal cavity, we might adopt the method so successfully practised in abscess of the liver by the late Dr. Graves, and cut down to, but not through, the peritoneum, and then apply poultices, with little doubt but that the matter will ultimately make its appearance through the wound. Should the abscess open spontaneously, we must counteract, as well as we can, any unpleasant consequences which may result; but, whether opened spontaneously or by the knife, we must endeavor to empty the sac, and to secure a free exit for the matter as it is secreted, by which means we shall avoid the prolongation of the disease, and all the distress of a fistulous opening. When the abscess points into the vagina, it is sometimes difficult to tell whether it has opened or not, from the small size of the orifice, and in such cases the microscope may be of great use. Very lately I was able to decide that an abscess had broken and commenced discharge, by the presence of pus corpuscles in the vaginal discharge. When the matter has been fairly evacuated, the diet must be generous, and a full share of wine or porter allowed.

819. IV. INFLAMMATION OF THE VEINS OF THE UTERUS, OR UTERINE PHLEBITIS. — This form of the disease has been frequently noticed by the more modern authors; amongst others, by Dr. John Clarke, Waller, Meckel, Louis, Dance, Tonnellè, Lee, Boivin, and Dugès, Ferguson, etc., and in a series of papers on Metro-peritonite, by M. Nonat.[1] Nor is it very rare: for M. Tonnellè found pus in the veins in 93 cases; and in the thoracic duct in 3 cases out of 134; and Dr. Robert Lee, in 45 cases, had 24 of uterine phlebitis.

820. CAUSES.—Dr. Robert Lee considers that it may be the result of mechanical injury to the uterus, either during the labor, or by the force used to extract the placenta. "Uterine phlebitis," he says, "appears to result from the mechanical injury inflicted upon the uterus by protracted labor; from the force required for the extraction of the placenta in uterine hemorrhage; from retained portions of the placenta undergoing decomposition in the uterus; the application of cold, and, perhaps, of contagion; or from any of the causes which produce the other varieties of uterine inflammation. M. Dance considers deranged states of the lochia to be a frequent

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[1] Revue Méd. Franç. et Étrang., 1837.

cause of the disease; but these are consequences and not causes of uterine phlebitis.[1] It may follow after hemorrhage, or arise from cold, or the decomposition of retained portions of the placenta. It may be excited by any of the causes of the other varieties of puerperal fever. Dr. Bartsch observes, "As to the *causes* under which uterine phlebitis was developed, we found it occurring most frequently—1. In women who approached the critical period of life, especially if they were primiparous. 2. In women affected with varicose tumors of the thigh, and external genital organs. 3. In females, who, during pregnancy, were submitted to the influence of depressing passions—fear of exposure, jealousy, sorrow, etc. 4. In individuals who, from the symptoms they presented, had frequently employed abortive remedies. 5. From mechanical injury of the uterus during pregnancy, especially if it were followed by abortion. 6. In females subject to chronic disease, as cough, difficult menstruation, hemorrhoids, fluor albus, chronic diarrhœa, and constitutional syphilis. 7. After flooding, during or after delivery, especially from placenta prævia, after difficult labors, after obstetrical operations, especially those requiring the introduction of the hand into the uterus. 8. Finally, the greater number of cases occurred in the months of February, March, April, and May, in females who, the year before, had been attacked by 'la grippe.'"[2]

821. SYMPTOMS.—In women of previous good health, the attack commences generally in twenty-four or thirty-six hours after delivery. The patient complains of pain in the uterus, more or less acute, preceded, accompanied, or followed by rigors. The uterus is tender on pressure, and the lochia and milk are both suppressed. There is headache, and slight incoherence; a sense of general uneasiness, and sometimes nausea and vomiting, with acceleration of the pulse. After a time, these symptoms are succeeded by increased heat of surface, tremors of the muscles of the face and extremities, rigors, great thirst, dry brown tongue, frequent vomiting of green fluid, rapid full pulse, hurried respiration, etc. The head becomes more involved, and we find the patient in a state of drowsy insensibility, or violent delirium and agitation, followed by extreme exhaustion. The surface of the body assumes a deep sallow or yellow color; and occasionally petechial or vesicular eruptions have been observed on different parts of the body. The pain may or may not increase, but the uterine tenderness is certainly augmented, and the abdomen is often swollen and tympanitic. In some very rare cases, there is little or no local distress, and the existence of the disease could not be discovered except for the secondary affections. Such was the case with a patient under my care. She had no uterine pain or disturbance, no tenderness on pressure; and yet, on the seventh day after delivery, a smart febrile attack preceded the formation of a large abcess near the left elbow-joint: after which, a second followed, on the top of the shoulder, and a third in the right arm, above the elbow.

822. The patient may die during the acute stage, but the majority live longer, and exhibit the most interesting phenomena, connected with this variety of puerperal fever, and distinguishing it from all others. I allude to the *secondary diseases of other organs.*

The *brain*, though often functionally disturbed (135 in 304, *Lee and Ferguson*), is not frequently the seat of organic disease. Its vessels are sometimes congested, and lymph diffused in the pia mater, or serum in the ventricles. According to M. Dugès, there is arachnitis once in 266 cases. Portions of the brain are occasionally softened and disorganized; or there is purulent infiltration into the cerebral substance.

In the *chest*, we find evidences of inflammation of the pleuræ, effusion of serum of the same character as that in the peritoneal sac; and occasionally effusion of blood.

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[1] Diseases of Women, p. 54.

[2] Report in Lancet, April 16th, 1[illegible]

M. Tonnellè found	pleurisy	in 29 cases.
	effusion of serum	in 8 "
	effusion of blood	in 6 "

The *lungs* are often greatly condensed, of a dark red color, with infiltration of purulent matter; or they may be in a state of "complete dissolution, having all the characteristics of gangrene, except in many cases its peculiar fœtor."

M. Tonnellè found	pneumonia	in 10 cases.
	tubercles	in 4 "
	abscess	in 8 "
	gangrene	in 3 "
	pulmonary apoplexy	in 2 "

The symptoms of the secondary affection in these cases (cough, dyspnœa, etc.) are but slight, and are completely masked by the more serious primary disease. Dr. Robert Lee observes,[1] "In four cases which have fallen under my observation, where there had been only obscure pain during life, with slight cough and dyspnœa, copious effusion of lymph and serum was found within the cavities of the thorax; the pleura was covered with false membranes, and portions of the lungs had fallen into a state of complete gangrene. In one individual, the pleura had given way by sloughing; and the right side of the chest was found distended with air. Gangrene, also, sometimes takes place rapidly in those parts of the body on which the patient rests; and the same process is established in other soft parts, where no pressure has been made. In a case related by Cruveilhier, which did not prove fatal, the nose became black and gangrenous."

The *heart* is often enlarged, softened, and friable; its inner membrane deeply stained; lymph and serum are also occasionally found in the pericardium. There are white patches on the outer covering of the heart. I have never remarked any peculiar disorganization of the great arteries; they are often intensely stained.

The *intestinal canal* is not frequently the seat of organic change. The mucous membrane of the stomach is sometimes inflamed, softened, and occasionally its coats are perforated, giving rise to peritonitis. Dugès has remarked, that the brown viscid matter exuding from the perforated portion of the stomach, seems to act on the neighboring organs like caustic — adding as a proof of this surmise, the fact of his finding a continuous series of perforations of the diaphragm, mediastinum, œsophagus, and lungs, all in the immediate vicinity of a perforation of the large extremity of the stomach."[2] Between the mucous and muscular tissues, there is an effusion of clear reddish serum, when the vomiting has been excessive. The mucous membranes of the intestines, also, may be softened, and the walls of the canal perforated.

M. Tonnellè found	gastro-enteritis	in 1 case.
	enteritis	in 4 cases.
	entero-colitis	in 1 case.
	the stomach softened	in 8 cases.
	the stomach ulcerated	in 5 "
	the stomach perforated	in 5 "

The *liver* is occasionally diseased: its substance may be congested, softened, or contain abscesses. M. Tonnellè met three cases of abscess in the liver.

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[1] Diseases of Women, p. 49.

[2] Ferguson on Puerperal Fever, p. 36.

The structure of the *spleen* may be softened and disorganized. M. Tonnellè relates two cases of abscess.

The *kidneys* present inflammation of their peritoneal coat, depositions of pus, and flakes of lymph, alterations in their veins, softening, and great engorgement; both kidneys are rarely attacked at once. The ureters and bladder are more often the seat of pain and congestion, than of disorganized structure.

The *eyes* are also affected. The conjunctiva becomes inflamed, the eyelids swollen, lymph is effused into the anterior chamber, and the sight is destroyed. Cases of this kind are related by Dr. M. Hall and Mr. Higginbottom, although not by them attributed to uterine phlebitis.[1] Dr. R. Lee states, that "In two cases which came under his care, the conjunctivæ of both eyes, without much pain, suddenly became intensely red; the corneæ opaque, and the eyelids much swollen, and under their lining membrane a large serous deposition took place; lymph and pus were also effused into the anterior chamber, and in one the cornea ultimately burst."[2] A case of the secondary affection of the eyes is related by Drs. Hardy and M'Clintock.[3]

The *joints* are attacked by inflammation, and sometimes the cartilages by ulceration; and the various products of inflammation are found within the capsular ligaments.[4] M. Dugès has thus placed the joints in the order of frequency of disease: 1, the hip; 2, the elbow; 3, the knee; 4, the foot; 5, the metacarpus; 6, the shoulder. Dr. Ferguson has found the elbow and knee more frequently affected than the hip. M. Tonnellè met six cases of abscess of the knee; two of the elbow; and two of the symphysis pubis. Drs. M'Clintock and Hardy relate one case of puerperal arthritis of the shoulder, and another of the little finger.[5] Upon the whole, they agree with Dr. Ferguson as to the joints most frequently affected.

Sero-sanguineous fluid may be effused into the *muscles* or cellular substance of the limbs, giving to them the appearance of erysipelas. M. Tonnellè mentions three such cases. As to the extent of this infiltration, it may be circumscribed within a few inches, or it may extend between two joints, rarely occupying the whole limb.

An *abscess* may be formed in the muscles or cellular membrane of a limb; or a succession of abscesses may occur, as in the case I have mentioned; or the pus may be diffused through the various soft structures. The quantity is sometimes enormous; the patient suffers much pain, and may be seriously injured, if the discharge continue long. The symptoms in the latter case are those met with ordinarily in abscess, except that at the beginning they sometimes resemble a rheumatic attack.

823. MORBID ANATOMY.—The primary morbid change is evidently in the veins of the uterine region; their coats are thickened, and sometimes so much contracted as to render the canal impervious. The lining membrane is generally paler, and coated with lymph or pus, which may extend to a considerable distance.[6] Acccording to Boivin and Dugès,[7] "it is in the lateral veins, at the point where they are collected together to leave the uterus, and merge into the plexus of the ovarian veins, that the pus is most commonly found; in some rare instances, all the sinuses are filled and even distended with it; sometimes there are albuminous concretions mixed with

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[1] Med.-Chir. Trans., vol. xiii. [2] Diseases of Women, p. 50. [3] Midwifery. p. 139.

[4] Lee on Diseases of Women, p. 50. Beatty, Dublin Journal, vol. xvi. p. 340.

[5] Ibid., pp. 12–24.

[6] Ferguson on Puerperal Fever, p. 89. J. G. Sasse, de Vasorum Sanguif. Inflam. Halle, 1797.

[7] Diseases of the Uterus, trans., p. 327.

the fluid; even the veins are occasionally obliterated by a yellow concrete matter. When the substance is entirely fluid, the interior of the vessels is of a light rose color, whitish, and smooth, and often even pale and yellowish. We have observed, though only twelve or fifteen times, that this inner surface was uneven and adherent to the albuminous flakes."

The disease may be confined to the veins of the uterus, or may involve those of neighboring parts. The spermatic vein is the one more frequently affected, then the hypogastric; but it may involve the renal veins, as far as the kidneys, or even the vena cava. It is remarkable, that it is generally the veins of one side only that are affected, and that side is the one to which the placenta was attached. When the disease affects veins distant from the uterus, the surrounding cellular tissue is hardened, and contains puriform matter.

Dr. Ferguson observes that, "In a certain number of cases, no lesion can be discovered in the vein, but the presence of some unnatural fluid. It is disputed whether it is absorbed, or the product of venous inflammation. It is of little moment which of the two opinions be adopted; the disease depends not upon how the matter is produced, but whether it enters the circulation. Whether this be by absorption or by inflammation, puerperal fever is the result."

824. Diagnosis.—It may in many cases be extremely difficult to distinguish this from the other varieties, at least in the early stage.

Generally speaking, the pain and tenderness are more local and limited than in *peritonitis*, and at an advanced period the presence of the secondary disease will at once indicate its true character.

825. Treatment.—Severe cases of this species of puerperal fever appear to defy all our resources. When it is the prevailing characteristic of an epidemic, the vast majority will die.

"The two indications," says Dr. Ferguson, "are, 1. to attend to the local lesions; 2. never to forget that these are not the disease, but merely the effects of a more diffusive, though concealed cause, to act on which our remedies should be directed. The *rationale* of the treatment, therefore, consists in the exhibition of such remedies as will act on this cause, and such as will alleviate or remove the local affections; taking care that in our attempt to effect the latter end, we do not so act on the constitution as to give additional energy to the more deadly power of the concealed cause."

This rule should direct our employment of leeches, blisters, calomel, and opium, etc., in the early stage, and stimulants and tonics in the latter. Dr. R. Lee says that "The French physicians, however, are of a contrary opinion, and are satisfied that we possess a powerful remedy, even in the worst cases, in mercury, employed so as to excite salivation. In several cases of uterine phlebitis, I have employed this remedy to a great extent, externally, and speedily brought the system under its influence: yet the progress of the symptoms was not arrested; and the patient died as others had done, when the mercury had not been administered. In other cases I have employed mercury to a great extent, internally, without the slightest benefit; and it may justly be doubted, from the results of M. Desormeaux's practice, whether or not it possesses the influence M. Tonnellè supposes; for of forty-three cases where mercury was used by him as the chief remedy, only fourteen recovered."[1]

Dr. Copland speaks in a more hopeful tone as to the results of treatment. "Hunter's treatment of phlebitis," he says, "was powerfully tonic, stimulant, and restorative; and he directed it with the view, correct both in pathology and therapeutics, of enabling the vessels of the diseased part to throw out lymph capable of coagulation, and of assisting the powers of life by these and other means to resist the progress and retrieve the consequences of the disease." Dr. Copland advises a small venesection, or leeches if necessary, and afterwards turpentine fomentations, a full dose of calomel, camphor, and opium, followed by turpentine, by the mouth and in form of enema. "In most instances the intention is not so much to evacuate the bowels (for they are often sufficiently open), as it is to exhibit a remedy which is calculated, by its passage into the circulation, at least partially to resist the changes taking place in the blood and vascular system generally, and at the same time to procure the discharge, both from the bowels and from the uterus, of such morbid matters as would be inevitably most injurious if retained even for a short period." Dr. Copland seems to have obtained more favorable results from the use of turpentine than most other practitioners. In Dublin, although it is occasionally beneficial, I do not know that much confidence is placed in it.

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[1] Diseases of Women, p. 118.

I feel very much inclined to agree with Dr. Copland, that probably "no other plan of cure will be found more beneficial for it than now advised; that no other than powerfully restorative, tonic, and soothing means will be found beneficial in this form of phlebitis, or indeed in any other."[1]

826. V. INFLAMMATION OF THE UTERINE LYMPHATICS.—This variety of puerperal affection was first noticed in France by M. Dance; and since by Boivin and Dugès,[2] Tonnellè, Duplay, Cruveilhier, and Nonat:[3] the former found pus in the lymphatics in thirty-two cases, and in the thoracic duct in three.

In this country, it was first recorded by Dr. R. Lee, in the following case, published in the Medico-Chirurgical Transactions.[4] "A woman, aged thirty, in an advanced state of pregnancy, was admitted into St. George's Hospital, July 1st, 1829, under the care of Mr. Cæsar Hawkins, in consequence of sloughing of the skin covering a diseased bursa of the patella. The removal of the bursa was followed by great constitutional disturbance, and on the 14th labor came on. Two days after, symptoms of uterine inflammation made their appearance, and on the eighteenth day death took place. Though the pain was relieved by bleeding, she never rallied after the attack. On examining the body, some puriform lymph was found in the pelvis, but there was no increase of vascularity in the peritoneum. In the broad ligaments some fluid was also effused, and on each side numerous large absorbent vessels were observed passing up with the spermatic vessels to the *receptaculum chyli*, which was unusually distended. All these vessels, and the reservoir itself, were filled with pus, but that in the receptacle was mixed with lymph, so as to be more solid; the vessels themselves were firmer and thicker than usual. The thoracic duct was healthy. The uterus was scarcely contracted, and the internal surface of the lower half was soft and shreddy, and in a state of slough. The upper part, where no pus was found externally, was also healthy, or nearly so, on its inner surface."

Boivin and Dugès state that the lymphatics "from half a line to a line in diameter, may be seen, in consequence of their injection with fluid, which distends them in the whole length of the ligaments which contain the ovarian veins: we have observed the lumbar glands in some cases lengthened by the pus injected into the vessels; and it has been found even in the thoracic duct."[5]

The local symptoms are exceedingly obscure, and the constitutional ones quite as severe as in uterine phlebitis, and in the present state of our knowledge not to be distinguished from them. The secondary lesions also resemble those in phlebitis.

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[1] Dictionary of Practical Med., part xiii., p. 535.

[2] Diseases of the Uterus, p. 329.

[3] Revue Méd., 1837.

[4] Vol. xv. p. 64.

[5] Diseases of the Uterus, p. 339.

As to the *treatment*, we are quite at a loss; as yet, we know of none capable of controlling the disease.

827. VI. **Gastro-enteric Fever.**—I am not quite satisfied to include this puerperal affection under the head of puerperal fever, because it rarely involves the uterine system; and because, on the whole, its course and termination are favorably contrasted with the other forms of childbed fever. Yet as it is not unfrequent, and I have known it prevail epidemically, and as I have no other place for it, I have ventured to place it here.

The affection prevailed epidemically in Dublin in 1851, and less extensively in 1852. I saw twelve or fourteen cases of the disease. It resembled "weid" in some degree, but with a considerable difference, and differing yet more widely from the ordinary forms of puerperal fever. Dr. Ferguson has described one form of puerperal fever, which seems to have a close resemblance to this affection; yet his "second form," with gastro-enteric irritation,[1] seems to be a much more serious attack than the one which I am about to describe.

I shall venture to describe the disease from my own experience, first relating one or two cases, the better to enable my readers to form their own judgment.

Case I.—Mrs. —— was confined of her tenth child in July, 1851. The labor was natural, the lochia and milk secreted amply, and she progressed favorably until the eleventh day. On the morning of that day, on which she was to leave her bed for the first time, before attempting to rise or dress, and without the slightest apparent cause, she was attacked with a rigor, followed by heat and sweating. The pulse became quick, and remained at about 100. The tongue became furred and white; the bowels flatulent and constipated. The milk, which had been abundant, almost entirely disappeared. The uterus was neither enlarged nor painful, nor was there any tenderness on pressure. The lochia continued natural in character, though diminished in quantity. A day or two afterwards, the bowels, which had been freed by medicine, became too much relaxed, accompanied by a most distressing amount of flatulence and frequent griping pain. The pulse very slowly diminished in frequency, and the milk gradually returned. Throughout, the uterus and its secretions were apparently unaffected. On the morning of the eighteenth day the patient appeared much better, nearly convalescent; but, in the course of the day, she had another rigor, followed by fever, which subsided, after twenty-four hours, like an attack of weid. From this time her convalescence was uninterrupted, though slow, and the milk was ultimately restored to its usual abundance.

Case II.—Mrs. M—— was confined of her second child, January 14th, 1852, after a favorable labor. The placenta was expelled in a few minutes, and everything went on well until the afternoon of the 16th, when a rigor occurred after taking some castor oil. Soon afterwards, most violent pain in the bowels came on and continued, but increasing in paroxysms. There was considerable tenderness on pressure, but not over the uterus especially. To the rigor, of course, succeeded fever. The skin became hot; the pulse rose to 130, with little or no thirst, but with a total loss of appetite. There was neither nausea nor vomiting, and the bowels were freely moved by the oil. Neither the milk nor the lochia were arrested, except for a few hours.

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[1] On Puerperal Fever, p. 22.

Forty drops of laudanum were given, and thirty more after an hour's interval. A linseed-meal poultice was applied over the entire abdomen. These measures were successful, to a great extent, in the relief of pain, and she obtained some sleep. *January* 17*th*. I found that the patient had suffered a good deal of pain occasionally, but the general tenderness had greatly subsided. There was a spot, however, in the left iliac region, which was very painful on pressure. The uterine tumor was free from tenderness. The lochia were natural in quantity and appearance, but had a heavy smell. The pulse were 120; the skin hot, but moist; some thirst; bowels moved twice. Twelve leeches were applied to the tender spot in the iliac region, and the poultices continued. Vaginal injections of warm milk and water twice a-day. Twenty drops of laudanum were given immediately, and a pill of calomel, gr. j., pulv. ipecac. comp. gr. iij., pulv. Jacob. gr. ij., was ordered to be taken thrice a day. 18*th*. Much relieved after the leeching. Pulse 110. Tongue white, but not loaded. Very little pain or tenderness, except in the left iliac region. Has slept better. Milk abundant. Lochia natural, and free from smell. Is much troubled with flatulence. The pills and poultices were continued. Towards evening, notwithstanding the opium she had taken, she had an attack of diarrhœa, accompanied with most distressing tenesmus and burning pain in the rectum, which was not relieved until she had had two enemata with thirty drops of laudanum in each. 19*th*. Some uneasiness in the rectum, but no purging. The iliac tenderness has entirely disappeared. The milk and lochia natural. Pulse 100 in the morning, but it sank to 84 in the evening. From this time my patient gained strength, and was no more troubled with pain. The bowels acted naturally, and the appetite was increasing, when, on the seventh day from the first attack, she had a rigor of long duration, followed by heat and sweating, and lasting twenty-four hours, just as in the former case. After this, she recovered very rapidly, and has been well ever since.

Case III.—Mrs. M—— was confined about the same time as the last case, under the care of Mr. Morgan. Her labor, which was natural, was followed by smart hemorrhage. About the third day she was seized with violent pains in the abdomen, increasing in paroxysms to an intense degree. There was no rigor; the pulse rose to 120, and the skin became hot, but there was no thirst. The breasts were full and the lochia natural. Although the abdomen generally was tender on pressure, there was no peculiar tenderness over the uterus. A full dose of laudanum relieved the pain to a certain extent, and the bowels were freed by medicine. We then applied the mercurial ointment, on lint, over the abdomen, and a poultice over it, and gave small doses of calomel, Dover's powder, and James's powder, three times a-day. The next day she was much better. Pulse 110. Tongue coated; the skin cooler; some pain and flatulence, with uneasiness on pressure. Milk and lochia natural. The day after she was attacked with violent diarrhœa and severe pain in the bowels, accompanied with great exhaustion, so that we were obliged to give wine, and had some difficulty in controlling the bowels by means of opiates, astringents, anodynes, enemata, etc. After we had succeeded in quieting the bowels by these means, and relieved the pain, the pulse still continued for some days above the natural standard. In other respects the convalescence proceeded quite satisfactorily.

Although the foregoing brief cases can scarcely give an adequate idea of the attack being so alarming as it really was, yet those engaged in midwifery practice will feel that, coming on so soon after delivery, and commencing with such formidable symptoms, I might be excused for fearing that the issue would be more serious than it proved. The commencement of th attack in many cases closely resembled that of puerperal fever, and it w not until after twenty-four hours that I could feel sure that the patient had escaped the more formidable disease.

828. I shall now shortly lay before the reader a summary of my observations of this affection of childbed, as it appeared during the epidemic, and as I have observed it in isolated cases.

1. The attack, in almost every case, occurred within a week after delivery: in some cases on the second day; in others on the third, fourth, or fifth day. In one case only have I known it to commence on the eleventh day, and it is remarkable that this patient had, for other reasons, been kept in bed up to that time. In no case have I been able to trace this attack to any special cause, exposure, imprudence, or errors of diet; but there was evidence in some of the cases that the bowels had not been sufficiently attended to during pregnancy. For the benefit of my junior readers, I may observe that it not unfrequently happens that the bowels may be moved daily during pregnancy, and yet that there may be an accumulation of fæcal matter to a considerable extent. I remember a case in which I could trace the colon across the abdomen by enormous fæcal accumulation, although the lady had complained of diarrhœa during pregnancy. In all cases, therefore, it is necessary that we should be sure that the bowels are amply freed, and not merely moved.

2. In comparatively few cases the attack commences with a rigor, not very severe, but sufficiently well marked. In two cases I observed the rigor to be repeated at the exact interval of a week, the second attack lasting twenty-four hours, and resembling weid very closely. The sweating stage was more profuse than usual.

3. The most striking symptoms in all the cases I have seen were the pain and diarrhœa. The former came on rapidly, increasing in paroxysms, and continuing until relieved by medicine. It was general over the whole abdomen, whilst severe, but as it declined it was felt more in one part than another; I think most frequently in the left iliac region. After the first severe attack was relieved, all the patients complained of frequent flatulent pains, with great discharges of flatus. Along with, and in proportion to, the amount of pain was the degree of tenderness; but it was remarked that, after the first impression of pain, the pressure, if equal and firm, was rather a relief; also, that the uterine region was less tender than any other part of the abdomen. It is worth noting, that in no single case did nausea or vomiting occur, but in all there was diarrhœa, even in those in which the bowels were confined at the commencement of the attack, or in which large doses of opium had been given for the relief of the pain. The amount varied; in some the discharges were few, but large and unhealthy; in others they were very numerous, and followed by great exhaustion.

4. The pulse was invariably quick at first, generally 120, sometimes 140, and gradually subsiding as the distress diminished. In a few cases it continued quick for many days, and excited much uneasiness. Its frequency was accompanied by heat of surface at first, which, however, soon diminished. In most cases there was a good deal of perspiration, and in one or two it was excessive. The absence of thirst was rather remarkable in all cases, except just after the exhibition of opium. The tongue was coated with white fur, but neither loaded nor dry.

5. In every case but one the secretion of milk was unaffected, the breasts remaining or becoming full and hard. In the exceptional case, the milk, which had been abundant, was completely suppressed for a time, but ultimately restored.

6. The lochia were generally diminished or suppressed for a few hours at first, but they speedily returned, and occasionally had a heavy smell for a day or two, after which they became natural and healthy.

7. I have already mentioned that, in two of the cases, there occurred a repetition of the rigor, followed by heat and sweating, like an attack of weid.

8. As a general rule, the attack lasted about a week; few were convalescent earlier, and one or two were protracted a few days longer.

9. I need not say that the diagnosis was a matter of extreme anxiety to me, beginning, as the attack did, with so much resemblance to puerperal fever, and presenting such formidable symptoms. However, one thing was clear, that, whatever else I might have to treat, I had undoubtedly to deal with a severe attack of intestinal irritation, as was shown by the pain, its fluctuations in seat, and its paroxysmal character, and which was confirmed by the occurrence of diarrhœa. So far was clear; but then arose the question as to whether there might not exist enteritis or peritonitis; and some support to this view was afforded by the rigor, the quick pulse, and the tenderness; but then the pain was shifting and paroxysmal, which is not generally the case in these diseases, and the tenderness was superficial, and not increased by prolonged pressure. Add to this, that the decided improvement in the course of twenty-four hours negatived such a supposition. There then only remained the question of how far the uterine system was involved; and as I found no particular tenderness over the uterus and no enlargement of that organ; that the lochia, if modified for a few hours, shortly resumed their natural character; and lastly, that the secretion of milk was abundant and unchecked, I came to the conclusion that the uterine system was unaffected, that no inflammation existed in the peritoneal serous membrane or in the intestines generally, but that the attack was one of severe irritation of the gastro-intestinal mucous membrane, accompanied with high fever, from some unexplained cause.

10. In the epidemics I have described I saw no fatal case, nor do I think such a result will occur unless the uterine system become involved, which would place the case in a different category. Such complications, however, do occur, and I have seen several such cases in consultation which terminated less fortunately. The indications of such an extension of the disease will be found in the increase and permanency of the fever, perhaps in its change of type, in the suppression of the milk and lochia, and in the local tenderness on pressure.

11. The *treatment* was simple enough, and very successful. The first object was to relieve the pain by large, and, if necessary, repeated doses of opium by the mouth, or by enemata of laudanum and starch, and externally by poultices of linseed-meal, alone or mixed with flour of mustard. When relief was obtained, if the bowels had not been sufficiently moved, I gave a dose of castor oil, but had I known that diarrhœa would follow the pain, as it generally did, I need not have done this. I then as a safeguard, gave small doses of calomel or grey powder, with Dover's and James's powders, three or four times a day, and in two or three cases applied the ung. hydrarg. to the abdomen underneath the poultices. After I became more familiar with the attack, I either omitted the mercury altogether, or left off the moment I was satisfied that the uterus was unaffected, but I continued the James's and Dover's powders and the poultices, until all pain and uneasiness ceased.

The flatulence was most effectually relieved by camphor mixture, with aromatic spirit of ammonia, compound spirit of ether, and tincture of orange-peel. I kept the patients on low diet at first, of course, and I found it necessary to be very cautious for some time, in increasing the nourishment, as a meal was very apt to be followed by pain and flatulence.

829. VII. MALIGNANT PUERPERAL FEVER.—**This form is comparatively** rare, except when the disease prevails epidemically. **It may** [illegible]

patient before delivery, immediately after, or after some days, and perhaps the most frequent time is at the end of the second or the beginning of the third day. "In the case of a female attacked *before delivery*," Dr. Copland observes, "to which I was called by Mr. Barnwell, the symptoms were the same as those observed by me in other cases. This patient was seized early on the 12th of February with acute pain throughout the abdomen, with enormous distension, and exquisite tenderness; with very rapid, full and soft pulse, varying from 130 to 136, and with frequent vomiting. I saw her in the afternoon of the same day. The vomiting and state of the pulse were as here stated. She complained of headache and of thirst, and was very despondent. Her tongue was broad, flabby, slimy, and tremulous; her countenance pale, anxious, and covered by perspiration, and her general surface warm, moist, and clammy. Labor pains came on that evening, but were even inefficient, the action of the uterus having ceased. Mr. Barnwell administered secale cornutum, which ultimately induced uterine action, and she was delivered after a labor of about twenty hours. On the following day (the 16th), the distension and tenderness of the abdomen were diminished; but the sickness and vomitings, with borborygmi and flatulent eructations, continued. Apathetic depression of spirits, anxious expression of countenance, flabby and slimy state of tongue, a very rapid, fluent, and weak pulse, clammy state of the skin, scanty amd almost suppressed urine, quick and oppressed breathing, a feeling of pressure of the diaphragm, requiring the head and shoulders to be elevated, were soon followed by the symptoms ushering in dissolution.[1]

830. The same author has given a graphic picture of the attack when it occurs *almost immediately after delivery*. He says that "the earliest indication of the impending mischief, is the great rapidity, softness, and weakness of the pulse, often attended by pain and tenderness at the epigastrium, by sickness and vomiting, followed by general distension and pains darting through the abdomen. But in the majority of cases there are neither chills nor rigors: in a few a feeling of coldness only; and in still fewer, slight rigors. In this state of the disease the patient soon becomes despondent, predicts her dissolution, is afterwards apathetic, and makes little or no inquiry for her infant. The milk and lochia are either little or not at all diminished, or are more than usually abundant. The abdominal pain and distension are sudden and quick in their accession; but the pain soon ceases, the distension remaining, and afterwards changing its character if the disease continues above two or three days. The tongue, from the commencement, is flabby, broad, and slimy, or covered by a mucous or creamy coating; the pulse is usually from 120 to 140, or even upwards, fluent, soft, or broad; and the general surface presents a lurid, or dusky, or dirty hue, and is covered by a clammy or offensive perspiration. The countenance is pale and inexpressive, unless where the pain is acute, when it becomes anxious and covered with perspiration. The mind is but little disturbed, beyond a state of complete apathy. As the disease proceeds, respiration is short, suspirous, or difficult; the pulse, small, soft, or irregular; the bowels frequently relaxed, and the stools offensive or passed without control. Distressing feelings of sinking, leipothymia, or restlessness supervene, and are soon followed by symptoms of impending dissolution."

I think it will be found that in the majority of cases the milk is not secreted at all, or very slightly, and that the lochia, which may appear natural for a day or two, become scanty, and with an offensive odor. I have also seen the abdomen remain in its natural state, neither painful, tender, nor distended; but these are rather exceptions.

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[1] Dict. of Pract. Med., part xiii. p. 519.

831. The most common period, I have said, for the incursion of the disease, is on the second, third, or fourth day; but it may occur even later. Its commencement may be marked by a rigor, or more frequently by a creeping, chilly feeling, a sort of imperfect rigor. Dr. John Clarke observes, "It has hardly occurred to me to see a case in which the disease began with a shivering fit, which is common in the commencement of many other fevers, and in the cases where the constitution sympathizes with the local inflammations which have been already treated of. If there was any degree of rigor, it has been so slight as to have escaped the attention of the patient, and the observations of her attendants. Indeed, so great a diminution of the sensibility accompanies the whole complaint, that even if a slight rigor should take place, the patient might not observe it, or being sensible of it at the time, might not afterwards remember it."[1] Coincident with this symptom, or preceding it, or independent of it, we always find the pulse unusually quick; instead of being from 80 to 90, it is generally from 120 to 130, and often higher, confirming the accuracy of Dr. John Clarke's observation, than no woman can be considered safe whose pulse is not under 100. But not only is it rapid, but it is generally small, weak, and easily compressed, not at all a pulse which would justify blood-letting.

At an early stage in the disease, many patients complain of pain in the stomach, bowels, or region of the uterus, accompanied by more or less tenderness, and followed by distension. This, however, is by no means always the case. In a patient I saw some time ago, who died on the third day of the disease, there was neither pain, distension, nor tenderness in any part of the abdomen. In others, we find distension with but little pain and no tenderness. Sickness of stomach, vomiting. and diarrhœa, may occur at the very outset of the disease, or on the second or third day, or not till towards the termination of the disease; in some cases it does not occur at all. Dr. John Clarke says that the purging commences on the third or fourth day, or even later.

But however the disease may commence, and however slight and few the local symptoms may appear, to the experienced eye they are always most formidable, and generally run a rapid course. The fever has a low, typhoid character; the patient is nervous, depressed, and fearful; the pulse is soft, small, and increasing in rapidity; the respiration quick, hurried, high, and often panting; the abdomen in many cases swollen, tympanitic, and painful; sometimes generally tender, sometimes only in a particular part; the lochia are sometimes altogether arrested, sometimes merely diminished in quantity, but more commonly, at least after a day or two, changed in quality, with a fœtid odor; in some rare cases they continue quite unaltered to the last. The secretion of milk, however, I have found invariably suppressed in the worst cases; in others, arrested after it had occurred. The urine appears generally diminished in quantity. The mental functions are but little disturbed till towards the termination, when it is not uncommon for the patient to be partially or temporarily delirious, but never violent. In many cases there is a peculiar nervous hurry, an excitement of manner, with tremulous movement of the features and hands. In most cases she is greatly depressed and fearful, anticipating an unfavorable result; in some few others I have known the hope of life vivid to the end. A patient I saw lately prognosticated her speedy removal to the drawing-room an hour before her death. It is very remarkable, that in most cases the natural affections of a mother seem perfectly quiescent, the patient rarely asking after, or manifesting any interest in, her child after the disease has fairly set in.

In the epidemic described by Dr. Joseph Clarke, he says, that "It always began with a distinct chillness or shivering. The pain in the cavity of the abdomen was not more frequent in one part than in another, nor was the tenderness so great as to be much affected by such trifling causes as the pressure of the bed-clothes. Little or no vomiting appeared in any stage of the disease, no delirium, and no unequivocal marks of putrescency in any part of the system. The pulse in general beat from 120 to 140 strokes in a minute. The lochial discharge and secretion of milk were not subject to any general law. Sometimes they continued regular for a short time, and sometimes they were suppressed from the beginning."[1]

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[1] On Pregnancy and Labor, etc., volume on Diseases of Women, published by the Sydenham Society, p. 419.

Dr. Douglas has thus sketched this form of puerperal fever as it appeared in the Dublin Lying-in Hospital in 1812:—"The sensorium here is seldom in any degree disturbed, whereas in the other varieties it is so frequently, and even sometimes is excited to high delirium. The pulse here is usually from the moment of attack soft, weak, and yielding, and in quickness often exceeds 160; whereas in the first species it is full, bounding, and incompressible; and in the second, small, hard, and incompressible, and in both moderately quick. The eye, instead of being suffused with a reddish or yellow tint, as in the others, is here generally pellucid, with dilated pupil. The countenance, instead of being flushed, as in the others, is here pale and shrunk, with an indescribable expression of anxiety, an expression altogether so peculiar that the disease could on many occasions be pronounced or inferred from the countenance alone. The surface of the body, instead of being, as in the others, dry, and of a high pyrexial heat, is here usually soft and clammy, and of a heat not above the natural temperature; and not only is the skin cool, with clammy exudation, but the muscles, to the impression of the finger, feel soft and flaccid, as if deprived of the *vis insita* by the influence of the contagion. Indeed, there is such prostration of strength and depression of the vital principle from the very outset of the attack, that I must suppose the contagion to act upon the human frame probably through the influence of the nervous system," etc.[2]

Dr. Gooch found that "the cases which were so numerous in these unhealthy seasons had the common symptoms and course of puerperal fever. They began a few days after delivery; the leading symptoms were, diffused pain and tenderness, with some swelling of the abdomen, a quick pulse, which was generally at first full and vibrating. Sometimes it was small, but still it was hard and incompressible; the skin was hot, though not so hot as in other fevers; the tongue was white and moist; the milk was suppressed. As the disease advanced, the belly became less painful, but more swelled, and the breathing short; towards the end, the pulse was very frequent and tremulous, and the skin covered with a clammy sweat; even in this state the tongue continued moist and the mind clear, and death took place generally about the fifth day."[3]

In the epidemic which appeared in Paris, in 1838, M. Voillemier describes the typhoid form as beginning with a long and severe rigor, often a few hours only after delivery; pain very intense over the whole abdomen, which rapidly became swollen; pulse feeble, compressible, and undulating, often 150; respiration hurried, anxiety extreme, severe frontal headache; countenance sunk, pale, and covered with a clammy sweat; constant vomiting of green matters; purging, stools fœtid. The patients rapidly sank at the end of a few days, or even hours. There was no regularity in the condition of either the lochia or milk.[4]

Dr. Copland thus sums up the characteristics of the attack: "Whatever may be the period or mode of its accession, this variety of the disease always pursues a rapid course, and unless early arrested by energetic means, it almost always tends to general contamination of the fluids and structures, and to death. At the commencement, the nervous system of organic life and the blood appear to be suddenly and seriously affected, as shown by the general loss of vascular tone and of sthenic action, by the disturbance of all the vital functions, and relaxation of contractile parts. The earliest symptom is often the remarkable rapidity of the pulse, which is also broad, open, soft, or fluent; or small, thready or irregular, but always very quick and compressible. Rigors and chills are generally absent; or if they have been present, they are either slight or of short duration. In the most rapidly fatal cases, or such as arise in crowded or close lying-in wards, they rarely occur; and in these the disease may be complicated, or present no prominent lesion or affection; the whole frame participating in the malady, through the medium of the organic, nervous, or vascular systems; or if any prominent lesion appears, the peritoneum or other shut cavities must frequently experience it, and present the appearances hereafter to be noticed."[1]

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[1] On Puerperal Fever. Sydenham Soc., p. 355.

[2] Dublin Hospital Reports. vol. iii. p. 154.

[3] On the More Important Diseases of Women, p. 40.

[4] Journ. des Connoiss., Méd.-Chir., Dec. 1839, Jan. 1840.

I have quoted thus largely from different authors, to show, in the first place, that we are not to expect any absolute regularity of symptoms, which will vary, not merely according to individual peculiarities, but also according to the peculiar character of the epidemic, which *may* differ each year, and which certainly does differ in different cities: and secondly, as illustrating the broad fact that the disease has a constitutional rather than a local origin. The most invariable symptoms are, the typhoid character, the vital depression, the quick weak pulse, suppressed milk, and disordered lochia; and I have seen more than one patient die without a single other symptom; neither pain, nor tenderness, nor swelling of the abdomen or its contents. Of course, in most cases other symptoms are added, such as I have already enumerated; but I feel it important to impress upon my junior readers that the disease is to be judged by the *character* of the symptoms present, and not by their number nor by the amount of suffering.

The disease advances with varying rapidity, and in its progress the symptoms increase and assume a more fatal character. The heat of skin is not augmented, but the surface is pallid, clammy, and assumes a dirty color, with dark circles about the eyes. The pulse becomes quicker, smaller, and weaker, and, towards the end, irregular and intermitting. The respiration is rapid, irregular, and often sobbing; the tongue moist, sometimes clean, but generally loaded with a whitish or yellowish fur, indented by the teeth, and tremulous. Occasionally, though rarely, it is dry and brown, as in typhus fever. The nausea and vomiting may increase or diminish, and there are frequent eructations, of bad flavor. The abdomen becomes very tense, with constant, or more commonly irregular, stings of pain, with heat, or general tenderness. The patient may either suffer from intense restlessness, anxiety, or lie in a semi-torpid state. The mind gradually becomes apathetic and indifferent, and the patient may either gradually and quietly, though rapidly, sink, or dissolution may be preceded by restlessness, dyspnœa, lividity of countenance, etc.

Dr. John Clarke mentions two symptoms worthy of notice, but which I think are by no means common:—"In some instances aphthæ will appear over the whole internal surface of the mouth and tongue, the hard and soft palate, the uvula, tonsils, and pharynx, so that they will all become perfectly white and swelled. The irritation from this cause produces a constant disposition to cough, which is also partly occasioned by the secretion of a thick mucus about the pharynx, which chokes up the trachea, keeping up a perpetual difficulty of breathing. In some instances similar aphthous appearances will be found about the anus." "In some instances purple spots have appeared before death, as in petechial fevers, probably depending either on great weakness of the vessels, which allows the fluids to escape into the cellular membrane, or upon some alteration in the state of the fluids themselves, by reason of which they are not so easily retained, or partly on the one, and partly on the other."

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[1] Dict. of Practical Medicine, part xiii., p. 520.

832. The local symptoms will vary very much, according to the part principally affected; for I believe that any of the forms of local disease, already described, may be found complicating this low childbed fever.

1. In some cases, there are absolutely no symptoms indicating abdominal disease. Neither pain, tenderness, nor distension is present. In a case I saw, to which I have referred, although the symptoms were of the worst kind, the only local symptom up to death was inflammation of a small branch of varicose veins of one leg, which was soon much relieved.

2. Peritonitis appears to be the most frequent local affection, judging from the descriptions of the different epidemics; but the practitioner would be greatly deceived who expected it to present the acute and well-marked symptoms usual in the ordinary cases of that disease. All the local characteristics are, if I may be allowed the phrase, muffled. There may be pain, even severe pain, but it rarely amounts to the agony we witness in idiopathic peritonitis; very often it is but slight, and in paroxysms, diminishing as the disease advances; and in two or three cases, in which I found after death universal peritonitis, there had been neither pain nor tenderness.

3. If the inflammation chiefly or solely occupy the womb or its appendages, there may be a good deal of pain, tenderness, and enlargement; or it may be slight and obscure, and only to be detected by a careful and minute examination. In the latter cases, I have most commonly detected a tender spot on the one side or other of the body of the uterus, and sometimes even when there has been no perceptible enlargement, and no tenderness when the uterus was generally pressed.

4. In some of the worst cases I have seen, presenting the most marked typhoid character, with apparent freedom from local disease and running the most rapid course, the only local lesion was uterine phlebitis, sometimes accompanied with tenderness on pressure at the sides of the uterus, but very often without pain or tenderness. But in such cases the disease is too quick in its course for the secondary characteristic lesions to show themselves, and therefore during life we can only assume the probability of venous or lymphatic inflammation.

In general, subject to the modifications I have mentioned, the local affections will present the symptoms and characters I have already described under the several heads; and I repeat that, in the low malignant childbed fever, we may find any of these local affections, or even two or more combined.

833. The *duration* of the disease varies much. In certain epidemics, cases have ended fatally in twenty, twenty-four, or thirty hours from their commencement; generally speaking, however, the final termination is most frequent from the third to the fifth day. Dr. Collins thus enumerates the periods of the commencement and termination of the cases he has recorded: — "Of eighty-eight cases that occurred during my residence, one had the disease well-marked before delivery; one was attacked in six hours; one in nine; one in ten; three in twelve; one in thirteen; one in fifteen; two in seventeen; one in eighteen; one in twenty; one in twenty-one; and two in thirty hours from delivery. Thirty-two were attacked on the first day; twenty-nine on the second; eight on the third; two on the fourth, and one on the eighth day. The disease seems to run its course with great rapidity in most instances. In fifty-six deaths in the hospital, it proved fatal at the

following periods after the date of the seizure: viz., two in twenty-four hours; one in twenty-seven; one in thirty-six; nine on the second day; fifteen on the third; thirteen on the fourth; four on the fifth; five on the sixth; three on the seventh; two on the eighth, and one on the eleventh."[1]

834. PATHOLOGY. — MORBID ANATOMY. — I must refer my readers to the foregoing sections of this chapter for a description of the peculiar morbid appearances observed in the different species of local affection, peritonitis, hysteritis, phlebitis, etc.; but in this malignant form there is in addition, as Dr. Copland has observed, an impaired cohesion of the tissues generally, and more or less of a turbid serous effusion into the serous cavities. He mentions also that in several cases in which bloodletting had been practised, "on every occasion I was struck by the peculiar faint odor and very dark hue of the blood; by the very soft state of the clot when the blood did separate into crassamentum and serum; by the appearance which occasionally presented itself, of a mass exactly resembling in color and consistence a common jelly, the coloring matter covering the bottom of the vessel in the form of a precipitate; and by, in some instances, a slight separation only of serum, the large, loose, gelatinous crassamentum, consisting chiefly of this jelly-like matter, the lowest stratum of which contained the black or dark-brown precipitate of coloring matter. These appearances of the blood were presented in several cases in the hospital, in 1823 and three or four subsequent years, in which cases blood had been taken before I saw the patients. It may here be remarked that I have seen many cases of this form of the disease, in which leeches had been applied to the abdomen; but in nearly all, and especially in those which occurred in the hospital, the blood which flowed from the bites did not coagulate; and great difficulty, almost amounting to an impossibility, of arresting the bleeding from them, was generally observed, owing both to the state of this fluid, and to the impaired vital cohesion of the tissues characterizing the advanced stage of the malignant form of this domestic pestilence."[2]

In a former section of this chapter, I have adduced other evidence of an altered state of the blood, and judging from all the evidence we possess, I am inclined to believe that the pathology of this malignant form of the disease consists in a depravation of the circulating fluid, either from absorption of noxious matters, or from inflammation of the veins, or from both combined, and accompanied by a diminished cohesion of the tissues generally.

835. CAUSES. — I have already enumerated every imaginable cause, I think, to which puerperal fever has been attributed, and I need not now recapitulate them. I shall merely observe, that a natural and easy labor does not necessarily preclude an attack, nor does a considerable loss of blood confer any immunity; on the contrary, when the disease prevails, whatever depresses the system seems to favor its production. It is chiefly when the disease is epidemic that we see this low and malignant form, and a knowledge of this fact, and of the coincident prevalence of erysipelas, should put practitioners on their guard, and induce tenfold more care and watchfulness than usual. Nor although the more numerous cases occur in hospital or dispensary practice, are we to anticipate an immunity in private practice. During the epidemics in this city, there have been several cases among the richer classes, which proved fatal. And in the more recent epidemic, the prevalence of the disease among the better classes has been still more remarkable. In addition, I have remarked that during an epidemic, even if the disease do not appear in private, lying-in women do not recover as frankly as usual.

I have already said enough about contagion, and earnestly cautioned those engaged in practice to adopt every possible precaution to avoid being the agents in spreading it. It would surely be a life-long sorrow to feel that a patient had been sacrificed to our carelessness.

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[1] A Practical Treatise on Midwifery, etc., p. 382.

[2] Dict. of Pract. Med., part xiii. p. 523.

836. DIAGNOSIS.—There can be no difficulty in distinguishing this disease from every other; its occurrence soon after delivery, the alarming nature of the symptoms, and their rapid progress, are unlike any other affection.

1. *Weid* will sometimes commence very severely, and excite our anxiety; but in general it is later in its commencement, more acute than low childbed fever in its symptoms, and comparatively evanescent.

2. The ordinary *sporadic puerperal fever* is more acute, and with more prominent local symptoms; there is nothing like the low typhoid character of malignant puerperal, except in uterine phlebitis; and if the latter be rapid in its progress, the two forms of the disease are similar in symptoms, and run a nearly identical course.

837. PROGNOSIS.—It is scarcely possible to conceive a disease in which the prognosis is more unfavorable than in a severe case of low malignant epidemic puerperal fever. Dr. John Clarke states, that according to his experience, about three-fourths die, and I do not believe this to be above the average. Of course, some epidemics are milder than others, and a larger proportion recover; in others, almost all fall victims. "The danger," says Dr. John Clarke, "seems to be greater in proportion as the accession is sooner after labor. Those who have had the disease at a later period have not been attacked with the same violence; the depression of strength has been less considerable, the tumefaction of the abdomen less extensive, and their chance of recovery has been, consequently, better. It has not occurred in my sphere of observation to see any recover in whom the swelling of the belly has been in any great degree. Indeed, it is hardly possible, when we consider the great injury which all the contents of it must suffer from the effusion of extraneous matter poured into the cavity, as will be hereafter described."

The unfavorable symptoms are, a pulse of increasing quickness and diminished strength, suppressed secretion of milk and lochia, fœtid lochia, nervous agitation, rapid, high breathing, swollen abdomen, diarrhœa, sunken countenance, clammy skin, exhaustion, etc.

On the other hand, a slower pulse, quiet bowels, diminished distension of the abdomen, natural respiration, and a warm, moist skin, with natural evacuations, and a continued supply of milk, are very favorable symptoms; but no improvement in any symptoms can be considered satisfactory unless the pulse becomes decidedly slower, fuller, and more steady.

838. TREATMENT.—If, by the treatment of low puerperal fever, we are supposed to mean such remedies as afford a reasonable hope of cure in the majority of cases, I must frankly avow that I know of no such remedies. As Dr. John Clarke observes, "This disease is less obedient to the power of medicine than almost any which I know. Its attack is so very insidious, and often entirely unperceived, and its fatal termination is often so sudden, that the time when medicine could be useful has often elapsed before it has been even known that the disease existed at all." I am satisfied that if *active* treatment be at all efficacious, or even justifiable, it must be within the first twelve hours—and how rarely do we see a patient so early? nay, in many cases I should doubt if very active treatment is ever justifiable. Thus, if bleeding be ever allowable, it must certainly be within the first twelve hours; but in the majority of cases I have seen, it was not admissible. Drs. Gordon, Armstrong, and others, no doubt, have spoken highly of the effects of early and large bleedings; but, so far as I can judge, the disease was of an acute inflammatory character. Dr. John Clarke gives the result of his experience in these words: "In the first place, then, let me caution

(especially younger) practitioners not to be misled by the tumefaction of the abdomen, so as to employ the lancet with the expectation of curing a supposed inflammation. Bleeding from the system has been always attended with manifest disadvantage, although it has been tried in patients who have been apparently strong and plethoric before. It has in some instances, for a short time diminished the pain, and the buffy appearance on the blood taken away has been supposed to justify the operation; but it generally lowers the patient extremely, and in some cases I have known it evidently hasten death. Bleeding from the skin of the belly by leeches, though it do not produce the same degree of debility, yet has in no instance, within my knowledge, contributed in any degree to the cure of the patient." He equally objects to blistering the abdomen; but from the cases I have seen, I am inclined to think it useful, and it affords an opportunity of applying mercurial ointment to a highly absorbent surface.

Mr. Norris has lately tried the application of the tincture of iodine over the abdomen, both in the sthenic and asthenic forms of puerperal fever, and from his testimony to its success I should be anxious to give it a fair trial.[1]

M. Doulcet's plan of emetics seems to have failed in producing the beneficial results he expected. Dr. Copland tried it, but it did not succeed, and in Dr. John Clarke's hands it was disadvantageous.

Calomel, in small or large doses, with or without opium, seems to be our sheet anchor, especially if we see the patient early. I have seldom found it possible to give it in large doses, in consequence either of the existing intestinal irritation, or of the irritation produced by it; so that I have generally given it in doses of one or two grains of calomel, with one-third of a grain of opium, or two or three of Dover's powder, every two, three, or four hours. At the same time I must candidly confess that, latterly especially, I have not found mercury to exert so decidedly beneficial an influence upon the disease, and it has frequently aggravated the suffering by occasioning diarrhœa. Can it be owing to the changed type of the disease, just as we find blood-letting, formerly so useful, now impracticable or injurious? Dr. Copland derived more benefit from the larger doses of calomel and opium, every five or six hours, with a dose of turpentine and castor oil. He also tried "the effects of camphor in large doses, in conjunction with calomel and opium, or with quinine and capsicum, omitting the calomel, aided by the turpentine, and preceding them by an emetic, when its use was indicated by the symptoms." If the diarrhœa be troublesome, the calomel must be omitted, but mercurial inunction may be substituted, and I have found the linim hydrargyri of the London Pharmacopœia very useful.

Dr. John Clarke's plan was to give bark, in powder and decoction, with opium, wine, fomentations to the abdomen, etc.. In some cases a gentle emetic was given, and emollient or anodyne clysters if diarrhœa were present.

The spirits of turpentine seems to be of use in some cases, but certainly not to the extent supposed by Dr. Brennan. It forms an admirable fomentation to the abdomen when blisters are not used, and if the bowels be confined, is a useful addition to castor oil, as a purgative, given either by the mouth or as an enema. It may be given in doses of from two drachms to half an ounce, once or twice a day, but it is so disagreeable to the stomach, that after a few doses patients frequently refuse to take any more.

Many remedies which have been found beneficial in the other and more local forms of puerperal fever, seem to be of little or no use in this variety, so that our means of treatment seem reduced to leeches, at a very early period; fomentations or blisters to the abdomen; calomel and opium, camphor and turpentine, wine, and other stimulants.

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[1] Med. Times and Gaz., Dec. 11th, 1852.

From the asthenic or typhoid character of this disease, and the atmospheric constitution during which it prevails; I feel myself inclined to anticipate more favorable results from a treatment resembling that of other typhoid affections. It is true, that bark, given in the Dublin Lying-in-Hospital, did not succeed, but yet I should be inclined to try it in such cases as I have described, and we have the testimony of Dr. John Clarke, and Lowder, and others in its favor.

I have no doubt whatever of the propriety of keeping up the strength by the timely administration of nourishment, and of the exhibition of wine much earlier and to a more liberal extent than has been usual. In truth, the type of disease generally and equally of puerperal diseases has so much changed of late years, that instead of the antiphlogistic treatment, which was undoubtedly succeseful, we must substitute a different, and in some respects an opposite, treatment, to be equally successful at present. Attention to this change of type will explain the success of different remedial measures, and is absolutely necessary to the scientific practice of our profession.

When the disease occurs in hospitals, the patient should be separated from all others, with separate attendants, and the greatest cleanliness observed. Before the ward is again used, it should be well scoured and ventilated, the bedstead scoured, the bedclothes washed, and the bed washed, or burned, which is better.

CHAPTER XXVI.

PHLEGMASIA DOLENS.—CRURAL PHLEBITIS.

839. THIS disease, under various appellations,—anasarca serosa, bucknemia sparganosa, phlegmasia lactea, œdema lactium, milk leg, white leg, swelled leg, etc. etc.,—has been long known to the profession, although there has been, and still is, much difference of opinion as to its exact nature. It was described by Roderick à Castro, in 1603, and subsequently by Mauriceau, Puzos, Levret, Petit, Leake, White, Hull, Trye, etc. It consists in a colorless swelling of one or both legs (simultaneously or successively) shortly after delivery, with pain, tenderness, and fever, lasting a certain time, and running a pretty definite course. The left leg is far more frequently affected than the right, although it is not easy to account for it.

It may occur with first children, but it is more frequent after subsequent deliveries. Women of a delicate constitution or lymphatic temperament are said to be the most liable to its attacks, and especially those who suffer from any uterine irritation after delivery. It not unfrequently follows extraction of the placenta, as in Mr. Chatto's case.[1] Women who have suffered from it once are very apt to have a slight return of it after the next confinement, without any repetition of the cause. I have a patient in whom this occurred several times, each time in a slighter degree.

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[1] Med. Gazette, Sept. 14th, 1839.

It may commence at any period after delivery, and the time makes a considerable difference in our judgment of the case, according as it begins before or after the sixth day. Of twenty-two cases observed by Dr. R. Lee, seven were attacked between the fourth and twelfth day, and fourteen after the second week. Levret mentions its occurrence on weaning the child; and Dr. Blundell,[1] that in "some rare instances it makes its appearance even months after delivery."

But it is not necessarily or exclusively a "*post-partum*" disease, and as it has an important bearing upon the correct pathology of the affection, I may be excused for entering into a little detail upon this subject. The earliest writer who mentions its occurrence unconnected with parturition is, I believe, Puzos, who relates two cases of pregnant women, one of four, and the other of seven months, in whom it occurred. Dr. Meigs says that he has met with many examples of phlegmasia dolens in pregnancy. Denman, Burns, Dewees, M'Clintock, etc., mention its occurrence after abortion, especially when a portion of the ovum has been left behind. Drs. Willan and R. Lee, Mr. Lawrence, Drs. Copland and Dewees, have recorded cases which occurred in patients laboring under malignant ulceration of the cervix uteri. Dr. Blundell has met with the disease in connection with malignant fungous growth from the same organ. Dr. Copland relates a case consequent upon hysteritis, in a lady who had not been pregnant for some years. The attack has also followed suppression of the menses by cold, as in the cases related by Tommasini and Boulogne, Dr. R. Lee, and Mr. M'Clintock. Again, there may be no disease or disorder of the womb or its functions, as in the cases of phlegmasia dolens accompanying dysentery related by Dr. Mayne; and lastly, it may occur in the upper extremity,[2] or in a well-marked form in the male sex.

840 SYMPTOMS.—As we have generally to do with the disease as it occurs in women who have suffered from irritation or inflammation of the womb, it is not surprising that the ordinary premonitory symptoms should commence with pain or uneasiness in the lower part of the abdomen, extending along the brim of the pelvis. I have seen this pain extremely severe, like an exaggerated after-pain, and lasting for some hours. In some cases there is a well-marked or imperfect rigor, in others nothing of the kind. The patient is irritable, depressed, and complains of great weakness, headache, and thirst. Dr. Denman remarks that, "Before the appearance of any swelling or sense of pain in the limb about to be affected, women become very irritable, with a sense of great weakness, and grievously oppressed in their spirits, without any apparently sufficient reason; complaining only of transient pains in the region of the uterus, and from these the approach of the disease has frequently been foretold. After a short time they are seized with an extremely acute pain in the calf of the leg, extending to the inside of the heel, and then, observing the course of the lymphatics, stretching up to the ham, along the internal part of the thigh, to the groin, occasioning a slight soreness on the lower part of the abdomen."[3]

Sometimes, however, there are no precursory symptoms, the patient being suddenly seized with pain in the calf of the leg; or it may commence like rheumatism, affecting the back and hip-joint; as Dr. Burns has remarked, "Sometimes there is no uneasiness in the belly, and the first symptom is sudden pain in the calf of the leg. Within twenty-four hours after the pain is felt, the limb swells, and becomes tense; it is hot, but not red—it is rather pale, and somewhat shining. The swelling sometimes proceeds from the groin downwards; but in most cases it is first perceptible about the calf of the leg, and proceeds upwards. It is generally followed by an abatement,

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[1] Obstetricy, p. 785.

[2] Dr. Winn, Med. Times, Aug. 14th, 1852.

[3] Introduction, p. 506.

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but not a cessation of the pain. Sometimes the disease begins like rheumatism, affecting the back and hip-joint. Then the upper part of the thigh becomes painful and swelled, and next the calf of the leg suffers; sometimes the limb at first feels colder than the other."[1]

When the disease begins in the pelvis, the pain speedily extends below Poupart's ligament down the thigh, to the ham, calf of the leg, and foot. It is constant, but occasionally remitting, and not much relieved by posture, though a depending position materially increases it. Shortly after the commencement, the inguinal region is tumefied and tense, and in a day or two the thigh becomes swollen, tense, white, and shining. This swelling may be confined to the thigh, or extend to the heel, and it will vary much in amount; occasionally, the leg is enormously increased in size. When the pain originates in the back and hips, the nates and vulva become swollen, glassy, and tense. When the disease commences in the calf of the leg, the swelling is first observed there or at the ankles, gradually extending itself up the leg and thigh. The temperature of the limb is generally increased, though in rare cases it is below the natural standard. At the commencement and decline of the disease, the limb pits upon pressure; but when the distention is very great, it does not. Just as Dr. R. Lee has described:—"In several well-marked cases, however, of crural phlebitis at the invasion of the disease, the impression of the finger has remained in different parts of the limb—more particularly along the tibia; but as the intumescence has increased, the pitting upon pressure has disappeared until the acute stage has passed away. At the onset of the disease I have also observed in several cases a diffuse erythematous redness of the integuments along the inner part of the thigh and leg."

In most cases the femoral vein may be traced from the groin down the thigh, feeling hard, and rolling under the finger like a cord. Of course, this is not the case when the attack is limited to the leg. There is a degree of tenderness over the entire limb, but it is very marked along the course of the inflamed vessel; generally there is neither redness nor discoloration, but in some few cases a faint red streak may be perceived. The inguinal glands share in the irritation, and may be swollen and hard; in some rare cases they suppurate; and according to Dr. Burns, mortification has taken place, and amputation been necessary.[2] Abscesses may also form in the cellular membrane. Either leg may be affected; but, as I have already observed, the left is more frequently attacked; and it not uncommonly happens that the sound leg participates in the disease before the other is perfectly well, and then the disease runs a similar course a second time. Mr. Sankey observes, "Most of my patients have had both legs affected, though not at the same time; but after going through the process Dr. Wynn has described in one, the other becomes affected; and unless prevented by the application of blisters, goes through the same stages, and takes the same time as the first."[3] In the cases of double attack which I have seen, the second limb was certainly more slightly attacked than the first; although this does not accord with the great experience of Dr. Denman, who found the second as severe as the first.[4] I have already stated that patients who have suffered from phlegmasia dolens after one labor, are very liable to have slighter returns, without apparent cause, after the next labor. When once the swelling takes place, the limb becomes useless; the patient can neither bend it nor place it on the ground.

The constitution, as might be expected, suffers considerably during the attack: the pulse becomes quick (from 100 to 140) though weak, the tongue white and coated, the thirst considerable, the countenance pale, the appetite lost, the bowels deranged, and the urine turbid. The patient is restless, and generally sleepless.[1] In very severe cases there is more or less tenderness above Poupart's ligament and at the side of the uterus, the lochia may be diminished or deranged, and the internal genitals are tender.

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[1] Burns, Midwifery, p. 609.

[2] Midwifery, p. 609.

[3] Ed. Med. and Surg. Journal, vol. x. p. 102.

[4] Introduction to Midwifery, p. 507.

With this account of symptoms, commencing perhaps with a rigor or chill, followed by pain in the abdomen, pain and swelling in the thigh and leg, quick pulse, etc., the acute stage may continue, for one, two, or three weeks, when the more formidable symptoms having subsided, the patient is more comfortable, and the disease takes on a more local character. Dr. Stokes has remarked that the greater the swelling, the less formidable and more local the disease.

841. TERMINATIONS.—1. The disease may, and most frequently does, terminate in *resolution;* the general symptoms gradually subsiding, the disease becomes local; and after five or six weeks the swelling diminishes, the tenderness disappears, the general health is restored, and by slow degrees the patient recovers the use of her limbs. It is long, however, before the affected leg entirely loses its *wooden* feel, and attains its natural power of motion and sensation.

2. The subsidence may be still more gradual, the limb continuing swollen, with an occasional increase of the tumefaction for months, the patient having imperfect sensation in it, and imperfect command over it. In such cases I have noticed a dense, thickened feel of the skin, or subcutaneous cellular tissue; and in one or two cases the patient had an attack of cutaneous inflammation, resembling large hives (Uticaria), which lasted for a few days, and was somewhat painful, but then disappeared. The veins sometimes remain varicose,[2] but I should hardly think that this is the effect of the disease. It is more likely to have been the effect of the previous pregnancy.

3. *Suppuration* may take place, even to such an extent as to supersede and change the character of the original disease, and even to threaten death from exhaustion.

4. *Death* may occur, either suddenly, perhaps on the patient raising herself in bed; or more gradually, from exhaustion, from paralysis,[3] or from some of the secondary diseases consequent on phlebitis. Dr. Burns observes, "This is not generally a fatal disease, but it is tedious, and often accompanied with hectic symptoms. Death, however, may be caused by suppuration or gangrene; or by exhaustion, proceeding from the violence of the constitutional disease; or by exertion made by the patient, which has sometimes suddenly proved fatal; or, after the leg appears to be getting better, daily shivering with vomiting, pain in other parts, and rapid pulse, with delirium, precede death."[4]

842. MORBID ANATOMY.—1. On opening the limb it is found to be distended with serum, effused into the cellular membrane.

2. The vein is found to be obliterated in some part of its course by clots of blood firmly adherent to its parietes, which are thickened; its inner membrane is of a deep red color, the result either of staining or of inflammation—most probably the latter. A layer of coagulable lymph is sometimes found lining the different vessels, and they have been observed to contain purulent matter. The veins which have been found to participate in these changes are the femoral, the external, internal, and common iliacs of either side; the epigastric, spermatic, circumflexa ilii, the uterine, vaginal, and saphena veins, and the vena cava.

3. Evidences of inflammation of the absorbents have been found in a con-

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[1] Burns, Midwifery, p. 608.

[2] Lee on Diseases of Women, p. 119.

[3] Todd, Cyclop, of Pract. Med. Art. Paralysis.

[4] Midwifery, p. 609.

siderable number of cases, and in some, purulent matter has been detected, according to M. Bouillaud.[1]

4. M. Dugès has shown that inflammation of the nerves occurs, at least occasionally, as a complication of this disease.[2]

5. Proofs of the occurrence of the secondary effects of phlebitis may be found in different parts, especially in the serous cavities, and in the formation of abscesses of the limb, and even of more distant parts.

843. PATHOLOGY — We are now in a condition to inquire into the pathology of this affection, which has given rise to so much dispute, and to such varieties of opinion. The older notions on the subject are mere speculations. For instance, Mauriceau considers it to be owing to a reflux upon the lower extremities of certain matters, which ought to have been evacuated in the lochia.[3] Puzos[4] and Levret[5] attribute it to deposits of milk in the affected parts (*dépôts du lait*); and the same opinion has extensively prevailed in these countries, as one of the popular names for the disease (milk leg) testifies. With some practitioners it was customary to keep the child constantly to the breast, to prevent the metastasis when threatened, or to remove it when it had occurred.

In the year 1784, Mr. White of Manchester, published an inquiry "Into the nature and cause of that swelling of one or both of the lower extremities which sometimes happens to lying-in women;" and he suggested or adopted the opinion that the disease depends on obstruction, or on some other morbid condition of the lymphatic vessels and glands of the affected parts. Mr. Tyre, of Gloucester, in an essay on this subject in 1792, attributed the swelling to a rupture of the lymphatic vessels, as they cross the brim of the pelvis, under Poupart's ligament. Soon after this, Dr. Ferriar maintained that there is a general inflammatory state of the absorbents in this disease. Dr. Hull (1800) considered the proximate cause of this disease to be an inflammatory affection; producing suddenly a considerable effusion of serum and coagulable lymph into the cellular membrane of the limb. All the textures — muscles, cellular membrane, lymphatics, nerves, glands, and blood vessels — he supposed to become affected.

So far the opinions were a mixture of theory and observation, without any attempt to base them upon pathological research. The first light thrown upon the subject by a *post-mortem* examination, was by Dr. Davis, Professor of Midwifery in University College, London, who in 1817 examined the conditions of the veins in a patient who had died with the disease, and found that they were the seat of extensive inflammation. The dissection is as follows: — "March 6th, 1817. — The left lower extremity presented an uniform œdematous enlargement, without any discoloration, from the hip to the foot. This was found, on further examination, to proceed from the ordinary anasarcous effusion into the cellular substance. The inguinal glands were a little enlarged, as they usually are in a dropsical limb, but pale colored, and free from the slightest sign of inflammation. The femoral vein, from the ham upwards, the external iliac and the common iliac veins as far as the junction of the latter with the corresponding trunk of the right side, were distended and firmly plugged with what appeared externally a coagulum of blood. The femoral portion of the vein, slightly thickened in its coats, and of a deep red color, was filled with a firm bloody coagulum, adhering to the sides of the tube, so that it could not be drawn out. As the red color of the vein might have been caused by the red clot everywhere in close contact with it, it cannot be deemed a proof of inflammation. The trunk of the profunda was distended in the same way as that of the femoral vein; but the saphena and its branches were empty and healthy. The substance filling the external iliac and common iliac portions of the vein, was like the laminated coagulum of an aneurismal sac, at least with a very slight mixture of red particles; the tube was completely obstructed by this matter, more intimately connected to its surface than in the femoral vein; adhering, indeed, as firmly as the coagulum does to any part of an old aneurismal sac; but in its centre there was a cavity containing about a teaspoonful of a thick fluid of the consistence of pus, of a lightish brown tint, and poultaceous appearance. The uterus, which had contracted to the usual degree at such a distance of time from the delivery, its appendages and blood-vessels, and the vagina, were in a perfectly natural state. There was not the least appearance of vascular congestion about the organ, nor the slightest distension of any of its vessels. Its whole substance was, on the contrary, pale, and the vessels everywhere contracted and empty. The state of the abdominal cavity and its contents was perfectly natural. That the substance occupying the upper part of the venous trunk, and the fluid in its central cavity, had been deposited there during life, from inflammation of the vessel, does not admit of doubt. I am also decidedly of opinion, in consequence of its firmness, and close adhesion to the vein, that the red coagulum in the femoral vein was the result of a similar affection extending along the tube; and that the passage of the blood through it, in the whole tract submitted to examination, must have been completely obstructed before death."[1] He then taught that phlegmasia dolens resulted from this cause, and in May, 1823, published a paper with cases and dissections.[2]

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[1] Dict. de Méd. et de Chir. Prat. Art. Phlegmasia dolens.

[2] Ibid.

[3] Mal. des femmes grosses, vol. i. p. 446.

[4] Traité des Accouch., p. 350.

[5] L'Art. des Accouch., p. 982.

In January, 1823, M. Bouillaud related several cases and dissections in which the crural veins were obliterated in women who had suffered from œdema of the lower extremities after delivery; and M. Bouillaud distinctly stated that he considered obstruction of the crural veins to be the cause not only of the œdema of lying-in women, but of many partial dropsies.[3] The date of this paper, although earlier than Dr. Davis's paper, in no way interferes with the claim of the latter to be the first who discovered and taught that phlegmasia dolens is essentially crural phlebitis. In 1824, M. Velpeau published some researches, from which he concludes that not only the veins are involved in the inflammation in some cases, but that inflammation of the lymphatics is at least as frequent a cause of phlegmasia dolens.[4]

In 1826, Mr. Guthrie hinted that probably the inflammation of the veins of the leg might be merely an extension from the uterine veins, and Dr. Robert Lee believed that he demonstrated this in 1829, by tracing the diseased veins back into the uterus, and finding there the disease equally well marked: "The left hypogastric or external iliac vein," he says, "was in the same condition, but in some cases reduced to a cord-like substance, and its cavity throughout completely obliterated. The branches of this vein, taking their origin in the uterus, and usually termed the uterine plexus, were found completely plugged up with firm red coagula."[5] More recently Dr. R. Lee has laid before the Medico-Chir. Society the results of his experience in the following summary: the paper contained the record of forty-three cases of phlegmasia dolens. The first nine cases were accompanied by *post-mortem* descriptions and preparations illustrating the disease; and the author was led, from the whole of the facts thus adduced, to the conclusions he had formerly expressed, "That the inflammation of the iliac and femoral veins gave rise to all the phenomena of phlegmasia dolens, and that the inflammation commenced in the uterine branches of the hypogastric veins, and from thence extended to the femoral trunks of the affected side." The next series comprised the history of twenty cases, which the author thought furnished additional evidence in favor of this conclusion, though, in consequence of the recovery of the greater number of the patients, an opportunity was not afforded of determining by dissection the actual condition of the crural veins. Nine cases followed, which demonstrated that phlegmasia dolens might occur wholly unconnected with pregnancy and parturition, and that in such cases the inflammation likewise commenced in the uterine branches of the hypogastric veins, and followed a course similar to what occurred in puerperal cases. In some of these the inflammation of the uterine veins was produced by cancerous disease of the os and cervix uteri; in others there was no organic disease of any kind previously existing. The concluding cases were five, in which crural phlebitis had followed inflammation of the saphena veins and of the deep veins of the lower extremities, from fracture of the tibia and fibula, and pressure of encephaloid tumors on the thoracic viscera.[1]

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[1] Letter from W. Lawrence, Esq., in Davis's Obstetric Medicine, vol. ii. p. 1204.

[2] Medico.-Chir. Trans. vol. xii.

[3] Lee on Diseases of Women, p. 149.

[4] Arch. Gén. de Méd., Oct. 1824.

[5] On Diseases of Women, p. 131.

MM. Petit, Gardien, and Capuron regard the disease as inflammation of the lymphatic vessels and glands.[2]

Dr. Burns adds another tissue as entering into the disease, for he remarks, "I consider that the nerves are implicated as much as the veins, and that whilst both may contribute, we shall find, in different cases, one or other predominate."[3] I am not aware whether this opinion was the result of *post-mortem* investigation or not, but it has since been confirmed by the researches of M. Dugès. Dr. Dewees agrees with Dr. Hull; and the able paper by M. Bouillaud so far confirms his view, as that, in his opinion, inflammation of the symphyses, veins, lymphatics, and nerves, is the proximate cause of the disease.

So far, then, it appears established, 1, that in phlegmasia dolens there is inflammation of the veins of the thigh and leg; 2, that marks of inflammation are found at the commencement of these veins in the uterus; 3, that at least in some cases the lymphatics and nerves are involved in the inflammation, although probably not in the first instance, nor as a primary cause.

844. But still two very important questions remain: 1, Does the inflammation originate in the crural vein itself, or does it originate in the uterus, and extend down the vein? 2. May not the inflammation of the vein be owing to some special condition to which it is secondary, as, for instance, some morbid condition of the blood?

In support of the latter view, Dr. Mackenzie read a paper at the Medico-Chirurgical Society (1853), founded upon a series of experiments on animals, in which he tried, 1, the application of ligatures to the iliac veins; 2, chemical and mechanical irritation of their lining membrane; and 3, sustained compression of the femoral veins by metal plates. Without entering more fully into these experiments, I may give the conclusions which the author drew from them: "1, that inflammation of neither the iliac nor femoral veins would account for, or give rise to phlegmasia dolens; 2, that the extensive obstruction of the veins met with in this disease is not producible by merely local causes, such as injury or inflammation of these vessels; 3, that irritation of the lining membrane of veins, independently of such local injury or inflammation, will only give rise to obstruction of these vessels to an extent commensurate with that of the irritation which may have been excited within them; 4, that extensive irritation of the lining membrane of veins, giving rise to obstruction and all the phenomena of phlebitis, may be excited by the presence of various unhealthy matters in the blood circulating with this fluid, and determined upon particular portions of the venous system; 5, that the origin of the disease is therefore to be sought for rather in a vitiation of the circulating fluid than in any local injury, inflammation, or disease of the veins."[1]

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[1] Lancet, May 21st, 1853, p. 580. [2] Mal. des femmes, p. 551. [3] Midwifery, p. 611.

Notwithstanding the ingenuity of the author of this paper, we cannot but feel that experiments of this kind are but imperfect illustrations of the effects of disease; and secondly, that in this disease, as the two conditions exist in most cases—viz., inflammation of the veins and a source of possible vitiation of the blood, it may be impossible to decide the exact limits of each.

After careful consideration and some experience, but without wishing to express myself dogmatically, the conclusions to which I have myself arrived are the following: — 1, that in phlegmasia dolens of puerperal women the most striking and general pathological condition is inflammation and obstruction of the veins; 2, that in most cases this state of the veins extends to the veins of the uterus, where the disease in all probability originated; 3, various considerations, however, lead us to conclude that the disease of the crural veins is not a retrograde propagation of the disease from the crural veins, but that the first morbid process is a vitiation of the blood, and that the effects upon the limb are produced in the course of circulation, so that, although the uterine and crural phlebitis be continuous anatomically, they are pathologically separate and distant; and 4, that a vitiation of the circulating fluid, primary or secondary, may be a more important element of this disease in most, if not all, cases, than has hitherto been supposed.[2]

These conclusions will embrace all cases of phlegmasia dolens, either of the upper or lower extremities, both of the puerperal and non-puerperal state, and also those which occur in men, and I think they afford an explanation (so far as we can expect one) of many of the vital phenomena of the disease, as well as being consistent with the results of *post-mortem* investigations. At the same time, it cannot be denied that there is room for further research into the state of the blood circulating in the affected parts, and other minute points of chemical or microscopical interest.

845. CAUSES. — The exciting cause seems generally to be the impression of cold or previous uterine disturbance. Almost all the cases I have seen have occurred after leaving bed at too early a period after labor.

846. PROGNOSIS.—Though we cannot say that the disease is without danger altogether, when severe, yet the proportion of deaths is so small, that in the great majority of even severe cases, our prognosis may be favorable; still more decidedly when the attack is slight. The danger, I think, may generally be estimated by the amount of uterine disease. I have also remarked that the severity of the constitutional symptoms is often inversely as the swelling of the limb.

847. DIAGNOSIS. — The characteristic marks of the disease are, the time of its occurrence—after delivery; the uterine symptoms preceding, the pain down the thigh and leg, the swelling; but especially the painful, hard, cord-like, femoral vein. When the greater part of these symptoms are present, there can be no doubt of the nature of the disease.

848. TREATMENT. — The condition of the patient after confinement will of necessity somewhat modify the activity of the treatment.

Generally speaking, the venesection will not be required; but if the patient be of a pletoric habit, if she have in some degree recovered her confinement, and if the disease set in with great violence, it may be advisable. Leeches, in numbers proportioned to the severity of the attack, should be applied along the course of the femoral vein, to the groins, or to the calf of the leg, and a poultice applied when they fall off.[3] If decided relief be not obtained, they may be repeated in smaller numbers, once, twice, or thrice.

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[1] Lancet, March 19th, 1853, p. 276.

[2] British and For. Med. Rev., July 1854, p. 71.

[3] Bateman's Report: Ed. Med. and Surg. Journ., vol. iii. p. 128.

As the bowels are almost always in some degree disordered, appropriate remedies must be tried. If diarrhœa be not present, purgatives may be given, and we are advised to prefer the saline.[1] I have seen much benefit result from small doses of tartar emetic given along with the cathartic, during the acute stage. Some effervescing draughts may also be given.

Different statements have been made as to the effect of blisters; some regarding them as specifics. Mr. Sankey observes:[2] "What I consider a specific is a blister applied to the calf of the leg, immediately on discovering the complaint. The first I apply to the calf of the leg, as the pain is generally most severe in that part, and there is less fear of its not healing than if applied lower. If required, I repeat them every two or three days, not at the same place, but higher or lower, according to the seat of the pain." Others, as Dewees, etc., altogether rejecting them as mischievous. My own experience is decidedly in favor of their utility, although in many cases turpentine fomentations will answer equally well.

In the more acute and severe cases, and especially if there be evidence that there is irritation or inflammation of the uterus, it will be advisable to give small and repeated doses of calomel and opium until either the symptoms give way or the constitution is brought slightly under mercurial influence. In milder cases an occasional mercurial purgative is beneficial, but it will rarely be necessary to continue its administration steadily.

When the pain is severe, or the patient irritable, restless, or sleepless, opiates will be found very useful, and with them, as Denman has recommended, we may combine diaphoretics or diuretics.[3]

When, by these means, the acute stage has been terminated, and the constitutional symptoms relieved, the local and general treatment must be changed. Gentle support may be afforded to the limb by a tight flannel bandage, and slightly stimulating frictions employed. In this stage, especially, the frequent application of small blisters has been recommended. Dr. Denman thus expresses himself: — "Then, also, but not sooner, it is necessary and proper to support the swelled limb by a slight flannel bandage, drawn gradually tighter, and to use different applications, such as the volatile liniment, or one composed of three parts liniment. saponis, and one part of tinct. cantharid., and sometimes small quantities of the ung. hydrargyri. The frequent application of small blisters to different parts of the limb has been also then strongly advised, and in many cases with evident advantage. Electricity has been tried; but of its real benefits I am not competent to judge. Certainly, many patients have been much relieved by persevering in the use of warm sea-bathing; and they are to be encouraged, but with some caution, to use exercise."

Tonics may also be given — decoction of bark or quinine, with dilute sulphuric acid, will be found the most serviceable. With these means must be combined an improvement in the diet, gradual, yet decided—meat broths, and a fair allowance of wine or malt liquor.

If at any period of the disease the lochia should become offensive, vaginal injections of tepid milk and water should be used once or twice a day.

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[1] Dewees, Diseases of Females, p. 492.

[2] Ed. Med. and Surg. Journ., vol. x. p. 402.

[3] Introduction to Midwifery, p. 509.

CHAPTER XXVII.

PUERPERAL MANIA.

849. FEMALES may suffer from an attack of mania during gestation, during labor, or after parturition. The two latter cases will occupy our attention in this chapter. The temporary delirium, or mania, which occurs during labor, was, I believe, first recorded by the late Dr. Montgomery. It appears at two particular periods of the labor — first, as the head passes through the os uteri, and again, at its exit through the os externum. It would appear to be owing to the extreme suffering at these times, acting upon an irritable and nervous temperament. It is very temporary, generally lasting but a few minutes, and then subsiding. The most curious point about it is, that the patient is generally conscious of her incoherence. As Dr. Montgomery observes, "It comes on suddenly during perfectly natural labor, and most frequently at that particular stage of the process which I have pointed out (dilatation of the os uteri). It is not accompanied nor followed by any other unpleasant or suspicious symptom; it occurs, perhaps, immediately after the patient has been talking cheerfully, and having lasted a few minutes, disappears, leaving her perfectly clear and collected, and returns no more, even though the subsequent part of the labor should be slower and more painful. In every instance which came under my observation, the patients were conscious that they had been wandering, and occasionally apologized for anything wrong they might have said, although they were not aware of what the exact nature of their observations might have been."[1] I have seen several cases of this kind, and, without exception, they corresponded very accurately with this description of Dr. Montgomery's. In one case the delirium, which occurred first during the dilatation of the os uteri, returned as the head was passing through the os externum; and this patient informed me that she was conscious of talking nonsense, and had in vain endeavored to resist it. Dr. Montgomery attributes this momentary incoherence to the suffering attendant upon the forcible distension and dilatation of the cervix, and there can be no doubt, I think, that this is the true explanation.

850. I shall now proceed to the consideration of *puerperal mania*, or that form of insanity which occurs in childbed soon after delivery, or at the commencement of suckling. It is a very distressing malady in itself, but doubly so from occurring at a moment ordinarily so joyful: and yet we cannot be surprised at the susceptibility manifested at this particular time, when we remember that "the sexual system in women is a set of organs which are in action only during half the natural life of the individual, and even during this half they are in action only at intervals. During these intervals of action they diffuse an unusual excitement throughout the nervous system: witness the hysteric affections of puberty, the nervous susceptibility which occurs during every menstrual period, the nervous affections of breeding, and the nervous susceptibility of lying-in women."[2]

Attacks of puerperal insanity are not infrequent. Esquirol states, that of 600 women in La Salpêtrière, 52 were of this kind; and of 1119 cases admitted in four years, 92 were cases of puerperal mania. He found it even more frequent in proportion among the higher ranks, for out of 144 cases of mental derangement in females of opulent families, the attack came on during childbed or lactation in 21. Dr. Haslam states, that of 1644 females in Bethlem Hospital, 84 were cases of this kind; and Dr. Rush mentions 5 cases out of 70 at the Philadelphia Lunatic Asylum.

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[1] Dublin Journal, vol. v. p. 61, Old Series.

[2] Gooch on the More Important Diseases of Women, etc., p. 127.

The attack may, in some few cases, be a continuance or a further development of the nervous affections of pregnancy; the nearer the approach to mental derangement during this period, the greater the probability of an attack after delivery.

851. There are two periods, however, at which patients seem especially obnoxious to it — 1st, immediately after delivery, to which the term *parophrosyne puerperarum* has been given; and 2dly, about the fourth or fifth day, when the full secretion of milk is established, and then it has been termed *mania lactea.* Dr. Burrowes adds a third period — about the fourteenth or fifteenth day, and he then attributes it to the effect of cold in checking the secretion of the milk. I find that of Esquirol's cases, 16 became delirious from the first to the fourth day; 21 from the first to the fifteenth day; 17 from the sixteenth to the sixtieth day; 19 from the sixtieth day to the twelfth month; and 19 after forced or voluntary weaning. Of Dr. Burrowes' cases, in 33 the access was before the fourteenth day; in 11, after the fourteenth and before the twenty-eighth day.

852. SYMPTOMS. The premonitory symptoms vary a good deal. In one sense, hereditary predisposition, or the nervous affections of gestation, are premonitory, but in most cases we shall generally find, previously to an attack, a degree of exhaustion, conjoined with great excitability, headache, and want of sleep; or the attack may accompany or follow convulsions, as I have seen in more than one case. Dr. Haslam remarks: "The first symptoms of the approach of this disease after delivery are, want of sleep, the countenance becomes flushed, a constrictive pain is often felt in the head, the eye assumes a morbid lustre, and wildly glances at objects in rapid succession; the milk is afterwards secreted in less quantity, and when the mind becomes more violently disordered it is totally suppressed."

Writers speak of various species of puerperal insanity, principally of two, however,—those cases in which the form is melancholia, or mania, and those in which phrenitis, or inflammation of the membranes of the brain, exist; the former is the true puerperal mania, and may be distinguished into two varieties — those where fever is present, and those in which it is absent. "Mania," says Dr. William Hunter, "is not an uncommon appearance in the course of the month, but of that species from which they generally recover. *When out of their senses, attended with fever, like pharaphenitis, they will, in all probability, die;* but when without fever, it is not fatal, though it (*i. e.*, the fever) generally takes place before they get well. I have had several private patients, and have been called in where a great number of stimulating medicines and blisters have been administered; but they have gone on at another time talking nonsense until the disease has gone off, and they have become sensible. It is a species of madness they generally recover from, but I know of nothing of any singular service in it." "Putting together," says Dr. Gooch, "This statement of Dr. Hunter with my own experience, I extract from it the following meaning: that there are two forms of puerperal mania, the one attended by fever, or at least — the most important part of it — a rapid pulse; the other accompanied by a very moderate disturbance of the circulation; that the latter cases, which are very far the most numerous, recover; that the former generally die. This agrees closely with my own experience." Dr. Burrowes states that he has not seen any case attended with fever, "except when coincident with the first secretion of milk, or where inflammation of the breasts or other parts has occurred, or upon forced weaning where there has been abundance of milk." But this is far from being generally true. I have seen several cases in which mania occurred before the secretion of milk, and yet the pulse was very quick, and the skin hot, with thirst, loaded tongue, etc.

In the one variety we find the attack preceded by wakefulness, excitability, headache, and after a while the mind is evidently astray; the patient may be joyous or melancholy, singing and talking incessantly, or obstinately silent, suspicious of every one, fancying injuries and offences on the part of her husband or friends, and forgetful of her child. The heat of the body may be slightly increased; that of the head is generally so, with a partial pain and sense of pressure or tightness, throbbing in the temples, and noises in the ears. The skin is generally relaxed and moist, but discolored; the face pale, the tongue whitish and loaded; the abdomen soft, and usually free from tenderness; the pulse weak and quiet; there is little, if any, sleep, and but little thirst; the bowels are torpid, and the stools unhealthy, often offensive.

In other cases we find the skin hotter, the pulse quick and small, the face often pale, sometimes flushed, the eyes red and vivid, and a delirium more resembling that of fever, with a brownish dry tongue, and sordes about the teeth.

Dr. Burrowes has described an attack of puerperal mania, somewhat different from the above. "In every instance, this variety has come on before the fourteenth day from delivery; it is preceded by pervigilium, the ideas are at first rapid and confused, images like those of dreams appear, and the delirium is soon confirmed by these illusions being considered as realities, and the speech and action corresponding with these impressions. The muscular powers are rarely violently exerted, though the patient frequently attempts getting out of bed without any fixed object: on the contrary, she generally lies supine; the countenance is rather vacant; the eyes are half closed, or fixed on vacuity, and, when roused, follow some imaginary object; the tunica conjunctiva is often highly injected, and the pupils very little sensible to light; the head is hot; the skin soft and relaxed, and partial sweating about the throat and neck. She continually mutters incoherently; loses consciousness, except when suddenly or strongly urged; if spoken to, answers shortly, and perhaps rationally, but lapses directly into the former state of indifference; the pulse is quick and uncertain; bowels generally easily moved; lochia and secretion of milk suspended. About the fourth or fifth day the debility is greater; there is more coma; the pulse is quicker, smaller and more unequal, with slight subsultus; picking at surrounding objects, or the bedclothes; averse from food or drink; insensible of evacuations; the tongue throughout presents nearly a natural appearance, though sometimes tremulous when protruded. It is usually fatal by the seventh or eighth day; and if the patient survive, chronic insanity commonly supervenes, and melancholia oftener than mania."[1]

That active inflammation of the brain or its membranes may occur during childbed is beyond question, but as it is very rare, and does not strictly belong to the question of puerperal mania, I shall not at present enter upon its consideration.

Thus, then, we may have an attack of mania supervening upon delivery, or occuring from the fourth to the fourteenth day, with or without precursory symptoms; in two varieties the main distinction appears to be in the pulse —in one it is quick, in the other natural; the third variety resembles low fever.

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[1] Commentaries on Insanity, p. 371.

The state of the uterus is apt to be overlooked, because there are but few symptoms, if any, referrible to it, and partly also because the patient is not always able to answer questions rationally. As far as my own experience goes, I should say that, 1, in certain patients no uterine complication occurs at all; 2, that in others, the uterus becomes involved in the course of the maniacal affection; and 3, that in some we may trace distinct marks of uterine disorder from the commencement, such as suppressed milk, offensive lochia, and tenderness in some part of the uterus. I suspect, moreover, that a division of these classes into two will correspond very closely with Dr. Gooch's classification by the pulse; the first class, and part of the second, presenting almost always a quiet pulse; the severer cases of the second, and all the third, having the pulse rapid, with high fever.

In all the varieties the stomach and bowels are much disordered. The character of the mania is not in any way peculiar to childbed.

853. The *progress*, *duration*, and *termination* of the attack vary a good deal in different patients. Dr. Burrowes observes, that sometimes the slighter attacks which occur immediately after delivery will disappear under the operation of a smart purgative, and an opiate. Of the 92 cases given by Esquirol, 55 recovered: 4 recovered in the first month, 7 in the second, 6 in the third, 7 in the fourth, 5 in the fifth, 9 in the sixth, 15 between the sixth and twenty-fourth, 2 after two years. Of these, 38 recovered in the first six months. Of 37 cases given by Dr. Burrowes, 35 recovered: 9 recovered in the first month, 5 recovered in the second, 5 in the third, 3 in the fourth, 2 in the fifth, 4 in the sixth, 1 in the seventh, 2 in the eighth, 1 in the ninth, 1 in the twelfth, 1 in the fourteenth, and 1 in the twenty-fourth month. That is, 28 recovered in the first six months. Of 80 cases by Dr. Haslam, 50 recovered.

But it may continue much longer, Of the cases described by Esquirol, 6 died; 1 six months after delivery, 1 in a year, 2 after eighteen months, 1 in three years, and 1 in five years. In Dr. Burrowes' table, it is stated that 1 recovered after two years, 1 after three years, 2 after four years, 1 after six years, and 1 after seven years; but he says that he never met with one permanently fatuous from puerperal insanity. Of Esquirol's 92 cases, six died, or 1 in 15. Of Dr. Burrowes' 57 cases, 10 died, or 1 in 6; 7 within twelve days of the access of delirium, 2 within seven days, and 1 after four months. Two of them had active uterine disease, and two others died of relapses after they had recovered from puerperal mania. Thus we find that the number of cases that recover is very considerable; out of 229, 146 recovered, or more than one-half. Of 90 of those who recovered, 66 were cured within six months, and the remainder at irregular intervals up to two years. Some we find continued insane much longer, remaining so for four, five, six, and seven years. But, on the other hand, a large proportion of deaths has sometimes occurred: 1 in 15 at La Salpêtrière, and 1 in 6 among Dr. Burrowes' cases.

[In simple uncomplicated cases of puerperal mania, although the disease may frequently be protracted, the diagnosis, according to our experience, is for the most part favorable. Distressing as the symptoms always are, and alarming as they often become to the friends of the patient and to the inexperienced practitioner, the uncomplicated forms of puerperal mania will be found almost invariably to recover under judicious treatment. It has been pertinently remarked, that "the question is not so much *whether* the patient will get well, as *when* she will get well."]

I do not think, however, that any statistics from a lunatic asylum can be taken as a correct standard of the mortality in puerperal mania, for patients are not sent there until the disease is more or less chronic: now, a great number of those who recover, do so within a short time after confinement, as in two cases I witnessed lately, both of which recovered from the delirium within ten days. Among the better classes, a patient would not be placed in an asylum until she had recovered from her confinement, and until the ordinary treatment had failed. On the other hand, death occurs in many cases within the month after childbed. "Mania," says Dr. Gooch, "soon after delivery, is more dangerous to life than melancholia beginning several months afterwards." He states, also, that none of his patients with a slow or moderately excited pulse died, whereas, in the fatal cases, the pulse was very rapid, though some with a rapid pulse recovered. In the two cases I have referred to, the pulse was very rapid, yet both recovered. "Nights passed in sleep, a pulse slower and firmer, even though the mind continue disordered, promise safety to life. On the contrary, incessant sleeplessness, a quick, weak, fluttering pulse, and all the symptoms of increasing exhaustion, portend a fatal termination, even though the condition of mind may be apparently improved. In the cases which I have seen terminate fatally, the patient has died with symptoms of exhaustion, not with those of oppressed brain, excepting only one case."[1]

I should myself lay great stress, in forming a prognosis, upon *the presence or absence of uterine complication*, as well as upon the frequency of the pulse. Any complication, indeed, must diminish the chance of recovery.

854. CAUSES.—I shall now consider the *causes* of this distressing malady. There seems little doubt that in many cases (Dr. Burrowes says in half the number, or possibly more, and Dr. Gooch bears the same testimony) the predisposition is hereditary, and of course mental deviations during gestation render an attack of puerperal mania extremely probable. Sleeplessness, which so fearfully increases nervous irritability, seems a very general predisposing cause.

Among the exciting causes we find cold, irritation, irregularities of diet, distress of mind, sudden mental shocks, frights, disordered bowels, excessive secretion of milk, and constitutional irritation thence arising, etc.; or the attack may form a part of or follow convulsions, as in a case which came under my care not long since.

Great stress is laid upon moral causes by the French writers. Esquirol, as I have before mentioned, states their frequency, compared with the physical, as four to one: and Georget mentions that out of seventeen cases, there were but two not proceeding from a direct moral cause. During the invasion of France, in 1814–15, eleven out of fourteen cases were from terror. British writers do not attribute so large an influence to this cause.

855. As to the *proximate cause* or *pathology*, it is not very easy to speak positively. I may allude to four different views on the subject: 1. From its occurring in many cases immediately after delivery, some have attributed it to disease of the uterine system. Fabret mentions a case of cancer which excited mania. Dr. Briere has related a case of mania from inflammation of the womb. Dr. Cooke discovered disease of the womb in two cases of puerperal mania. Dr. Burrows mentions having seen abortion and mania, the result of inflammation of the womb, in two cases in which he was consulted; one died, and the other recovered; and in two of the deaths in his table there was disease of the uterus, but whether it preceded the mania or not does not appear. In one of the species of puerperal mania described by Dr. Burns, he says, "the delirium is connected with the state of the uterus, particularly of the veins which are inflamed."[2] At a meeting of the Obstetrical Society of Dublin, Dr. Montgomery mentioned a case of puerperal mania in which the uterus and ovaries were found in a state of inflammation; and Dr. Hardy another, in which peritonitis existed, but was

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[1] Gooch on Diseases of Women, p. 124.

[2] Midwifery, p. 619.

not suspected till after death. I have certainly seen uterine inflammation follow puerperal mania, but that it existed previously I cannot say: the usual symptoms were absent. Still these cases, which are all I have been able to make out, form so very small a proportion to the cases in which there has been no disease of the womb, that without denying that the condition of the uterine system is in some way connected with puerperal mania, it is clear we cannot attribute it solely to organic disease of that organ.

2. Other writers regard the disease as inflammation of the brain or its membranes. Now it is granted, of course, that such cases do occur, but they are rare; and it is contended that in ordinary cases puerperal mania does not arise from inflammation, and the results of *post-mortem* examinations are in favor of the latter opinion. Burns, Campbell, Davis, Lee, and others, speak of it as a modification of phrenitis; Burrowes, Pritchard, Gooch, etc., as not being inflammatory. The latter distinguished observer thus gives the result of his experience: "In No. 1, the disease occurred in a pale lady, without any heat of skin or much quickness of pulse, and was not relieved by loss of blood. In No. 3, it occurred in one whese constitution was drained and enfeebled by nursing. In No. 4, it occurred in a pale woman, habitually hysterical, subject to bear dead children, from want of power to afford them life for nine months. In No. 5, it occurred in one in whom, for urgent reasons, the circulation had been reduced to the lowest ebb consistent with life. In No. 7, in one who had been living very low for a week, with such marked symptoms of the irritation of debility, that at first sight I thought it was the close of some disease that had been overlooked. It was speedily relieved, not by cupping and purging, but by the tranquillizing and sustaining power of opium. In No. 8, the disease was treated, though with all possible prudence and moderation, as an inflammatory state of the brain, by leeches, cupping, purging, and low diet, yet the patient died, not with symptoms of oppressed brain, but with those of exhaustion; and on examining the body, the whole venous system was found extraordinarily empty of blood. In No. 10, the patient fell as if shot, under the stroke of the lancet; and on examining the head, there was found no effusion, and empty bloodvessels. In No. 11, the disease came on after puerperal convulsions (a disease generally, but not always, depending on cerebral congestion), and after one of those enormous bleedings commonly practised in these cases, and no morbid appearances were discovered after death, in the brain. These cases, if fair specimens of puerperal insanity, lead straight to the conclusion that the disease is not one of congestion or inflammation, but one of excitement without power."[1] Add to this, that Esquirol found no traces of cerebral inflammation upon most careful examination.

3. Dr. Marshall Hall believes that the disease "results, in general, from all the circumstances following parturition combined, but chiefly from the united influences of intestinal irritation and loss of blood." "I am persuaded," he adds, "that real puerperal phrenitis is comparatively a rare disease, that puerperal mania is seldom of an inflammatory character, and that it is especially to be treated by those measures which are suited to the mixed case of intestinal irritation and exhaustion."[2] That many cases occur in patients exhausted from some cause, the extract I have given from Dr. Gooch will prove, and that the stomach and bowels are disordered in most cases is recorded by almost all writers, so that we cannot deny that Dr. M. Hall's view has much to support it. Nevertheless, it does not seem to express the whole truth, nor is the want easily supplied with any degree of precision.

4. The explanation of Dr. Gooch, which I have already quoted, as to the

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[1] Diseases of Women, p. 144.

[2] Diseases of Females, p. 251.

peculiar nervous susceptibility induced by the organic changes consequent on impregnation and child-bearing, although I believe it to be correct, is necessarily vague; nor is the view of Dr. Ferriar more accurate. He says: "I am inclined to consider puerperal mania as a case of conversion. During gestation and after delivery, when the milk begins to flow, the balance of the circulation is so greatly disturbed as to be liable to much disorder from the application of any exciting cause. If, therefore, cold affecting the head, violent noises, want of sleep, or uneasy thoughts, distress a puerperal patient before the determination of blood to the breasts is regularly made, the impetus may be converted to the head, and produce either hysteria or insanity, according to its force or the exciting cause."

Perhaps it is best simply to enumerate the elements which may concur to produce the attack. We have the nervous shock varying in degree, but always increasing the nervous irritability; the great vascular change; the disturbance of respiration and circulation; the exhaustion; and in many cases the loss of blood; this combination must necessarily leave the nervous system in a favorable state for the operation of the exciting causes I have enumerated, and the result is mania.

856. TREATMENT.—The treatment of puerperal mania is very simple as regards the materials, yet requiring calmness and judgment in their application.

1. Those who regard it as any modification of phrenitis, of course recommend bloodletting, with more or less liberality. Now, from what I have said as to the nature of the disease, it will be clear that in most cases it is inadmissible, or, if ever used, it must be with extraordinary caution, and by means of leeches, in cases where there is strength and quickness of pulse, and flushing of the head and face. I have, however, never found it advisable; and Esquirol, Haslam, Gooch, Burrowes, and Pritchard, are all opposed to it. The last-named author remarks: "If we consider that the greatest danger to be apprehended for patients laboring under puerperal madness arises from a state of extreme exhaustion, that many women die from this cause within a short interval from the commencement of the disease, and that, if they survive this period, the healthy state of the mind is in most instances restored, it will be evident that our chief endeavors must be directed to the present support of life." "Bloodletting, as a general remedy for puerperal madness, is condemned by all practical writers on whose judgment much reliance ought to be placed."[1]

2. When the stomach is overloaded, when indigestible food has been taken, or even for the purpose of lowering the pulse by the shock of vomiting, emetics have been found useful. They must, however, be used with caution when the face is pale, the skin cold, and the pulse quick and weak. Dr. Gooch prefers ipecacuanha to antimonials. Dr. Burrowes recommends nauseating doses of tartar emetic, with the saline mixture and digitalis, for the purpose of reducing the violence and fury of the patient; and Dr. Beatty informs me that he has derived great advantage from tartar emetic.

3. From the almost universally disordered state of the bowels, great relief is afforded by one or two brisk purgatives of calomel, followed by castor oil or Gregory's powder. The stools are dark-colored, and highly offensive; and in addition to the advantage of clearing out the bowels, purgatives act admirably as derivatives from the head.

4. After the bowels have been freed, the greatest benefit will be derived from narcotics. Denman prefers small and repeated doses of opiates, but Gooch, Burrowes, and Pritchard recommend full doses, and with this I concur: ten grains of Dover's powder, twelve drops of black drop, or an equi-

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[1] On Insanity, p. 313.

valent of the other preparations of opium. If opium disagrees, hyoscyamus must be given; and should sleep be induced, repeated small doses may be administered; when the head is very hot, and face flushed, we should postpone the exhibition of opium; and we must guard against constipation.

In more than one case recently under my care, in which opiates had no effect in quieting the patient or procuring sleep, we tried the inhalation of chloroform, and with great benefit: she became quiet, ceased talking, and occasionally was put to sleep for an hour or two at a time. Mr. Waters, of Liverpool, has published three cases of this disease in which the exhibition of chloroform was most beneficial: all recovered speedily.[1]

5. The head may be shaved, and a cold lotion applied; if the delirium continue, a blister may be applied, but it is not generally necessary.

6. In protracted cases, or when the patient is exhausted, nourishing diet, broths, etc., and even tonics, must be allowed; ammonia, with cinchona; oil of turpentine, wine, etc.

7. As uterine inflammation not uncommonly arises in the course of or follows puerperal mania, a close watch should be kept for the earliest symptoms, and if they appear, calomel in small and repeated doses, or mercurial inunction, should be added to the other remedies, with such other local applications as may be deemed advisable.

8. It will be necessary to keep the most careful watch upon the patient; the nurse, who ought, if possible, to be one familiar with such attacks, should never leave the room; friends ought to be absolutely refused admission; the apartment kept slightly darkened, and the entire house perfectly quiet.

9. When the mania disappears, and the patient is convalescent, a change of air and scene is most advisable.

CHAPTER XXVIII.

EPHEMERAL FEVER, OR WEID.

857. THIS is a short attack of fever, to which females are especially liable during the early part of their convalescence, though it may occur at a later period. Women of sensitive constitutions are the most obnoxious to it.

858. CAUSES.—The most frequent cause is the impression of cold, perhaps on rising from bed, or changing the room, etc. Indigestion, or irregularity of the bowels, may also give rise to it. Fatigue, mental agitation, and want of rest are also enumerated among the exciting causes.

859. SYMPTOMS.—The attack commences by general uneasiness, palpitation, and shivering, with headache, pain in the back and limbs, soreness of the breasts, thirst, rapid, and sometimes irregular pulse, etc. "On or before the approach of the disease," says Dr. Campbell, "the patient is observed to yawn and stretch herself greatly, and to appear very languid. To this succeeds a sensation of cold, first between the shoulders, and thereafter along the spine, and at last it becomes general over the whole body,

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[1] Journal of Pscychological Med., No. 5., Jan. 1857, p. 123.

attended with pain in the head and large joints. Sometimes a sense of soreness is felt in the uterine region, and if the lochial discharge be present, both it and the milk are diminished in quality."[1] To this succeeds a well-marked hot stage, with flushed face, throbbing temples, pain over the eyes, rapid full pulse, pain of the breasts, soreness of the abdomen, etc., and it terminates in a profuse sweat, which removes the fever, and relieves the other symptoms. The tongue is coated, the stomach is often disturbed, and the bowels confined. During the paroxysm, the fever often runs very high, and the distress is proportionally great. Occasionally the mind is confused and distressed, and in some cases the patient is delirious. For the time, the secretion of milk is diminished or suspended, and the lochia also; but they return after the paroxysm.

The fit is generally completed in twenty-four hours, always in forty-eight, and, if properly treated, it seldom returns; if neglected, however, it may assume the form of an intermitting, or continued fever. "It consists of a cold, hot, and a sweating stage; but if care be not taken, the paroxysm is apt to return, and we have either a distinct intermitting fever established, or sometimes from the co-operation of additional causes, a continued and very troublesome fever is produced."[2] Unless it assume this character, it is of very little consequence, and very easily managed.

860. Diagnosis.—From the violence with which it commences, it may easily be mistaken for puerperal fever; but the cessation of the paroxysm after some hours, and the absence of marked abdominal tenderness, will generally enable us to distinguish it. Indeed, the peculiar violence with which it commences is itself more characteristic of weid than of puerperal fever. "The suddenness of the attack, the great irregularity of the pulse, the absence of all local pain except that of the head, the intensity and irregularity of the succession of the different stages, will distinguish this from every other puerperal affection."[3]

861. Treatment.—During the cold stage, hot bottles and warm bedclothes may be applied, so as to relieve the distress. Warm drinks and cordials may also be given.

During the hot stage a comfortable quantity of clothing must be continued, and diaphoretics given, so as to favor perspiration; and during the sweating stage, we must guard against cold, and diminish the clothing very gradually.

As for purgative medicines, which are necessary, I have found the combination of salts, senna, and tartar emetic the most useful; but any other purgative may answer the purpose. If the tongue be foul, and the stomach loaded, an emetic may be advisable.

Very rarely will it be necessary to take away blood, and then only if there be much local pain. A few leeches to the head, or to the breasts, if they be painful, may be of use; but in the majority of cases they are unnecessary.

We should carefully examine the state of the uterine system, as irritation may otherwise go on unsuspected, and be the cause of much subsequent distress.

The diet may be nutritious after the paroxysm is over, and mild tonics may be given, if necessary. Dr. Campbell recommends five-grain doses of camphor, four or five times a day, for some days, to allay nervous irrtiability.

Great care must be taken, after the fever has terminated, to avoid all occasion of cold, or any cause which may reproduce the attack.

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[1] Midwifery, p. 841.

[2] Burns's Midwifery, p. 572.

[3] Campbell's Midwifery, p. 541.

CHAPTER XXIX.

SORE NIPPLES.

862. This is a very frequent and troublesome occurrence, and far more painful than would be supposed. It is more frequent with first children, but some women suffer from it after each confinement. It comes on generally after two or three days' suckling, and continues for an uncertain time, after which it generally subsides.

863. Causes. — In the majority of cases, it is simply the reiterated application of the child which causes it, by removing the sebaceous secretion — so that the skin, when dry, contracts, slightly hardens, and cracks. This process is aggravated by a slight degree of inflammation. But sore nipples may be owing to the state of the child's mouth, as is frequently seen when the child suffers from aphthæ; and on the other hand, the discharge from the nipples may inflame and excoriate the child's mouth.

864. Symptoms. — At first the nipple and areola are observed to be dry, rough, and harsh; then a great number of minute cracks may be seen; or the surface becomes excoriated, and pours out a serous discharge, which in some cases is acrid, and spreads the excoriation to the surrounding skin. Or the nipple may exhibit deeper fissures, dividing it into two or three portions. Lastly, in some cases the nipple becomes ulcerated, and part, or nearly the whole, destroyed. Each attempt at suckling makes the nipples worse for some time, and occasions them to bleed. The torture to the patient is very great, and it requires all her fortitude to persist in nursing at the cost of so much suffering.

But this is not all; for if the inflammation be great, it is propagated along the lymphatics to the mammary gland, and then gives rise to inflammation and abscess; and, indeed, I believe this to be one of the most frequent causes of abscess.

865. Treatment. — To prevent this disorder the nipples should be washed with soap and water, and dried, and afterwards bathed with spirit and water, night and morning, during the last month of pregnancy. In many cases this will be successful. A combination of white wax and butter is a popular remedy, and is often useful. Stimulating ointment, such as ung. hyd. nit., diluted with axunge, is sometimes of service; or the parts may be touched with burnt alum, nitrate of silver, or dusted with some mild dry powder.

When excoriation or "chapping" has occurred, spirit lotions may be applied, or one formed of sulphate of alum, zinc, or copper, acetate of lead, etc., is dissolved in rose water; but the one I have found most effectual is a weak solution of nitrate of silver, to be applied after each time of suckling — care being taken to wash the nipple previous to the next application of the child. Mr. Druitt recommends a solution of five grains of pure tannin in an ounce of distilled water.[1] Dr. Johnson thinks highly of the following lotion and ointment, which may be applied alternately, or either alone:[2]

Subborat. sodæ, ʒij.
Cretæ præcip., ʒj.
Spt. vini,
Aquæ rosæ, ā ā ℥iij. M. Ft. lotio.

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[1] Braithwaite's Retrospect, vol. x.

[2] M'Clintock and Hardy's Midwifery, p. 14.

℞ Ceræ albæ, ʒivss.
Ol. amygdal. dulc. ℥j.
Mel. despumat., ℥ss., dissolve ope caloris, dein adde gradatim
Bals. Peruvian. ʒiiss.
Ft. ung.

Drs. M'Clintock and Hardy speak highly of tincture of catechu in simple excoriated nipples.

In two cases of ulcerated or fissured nipples, Prof. Simpson drew the edges together, and covered them over with a pretty strong layer of the solution of gun-cotton. This maintained the edges so firmly together, that suckling did not reopen them, and consequently they soon healed. I have tried it, but with a less successful result. M. Bourdell has recommended the application of lint soaked in tinct. of benzoin, and repeated frequently, so as to form a coating over the sore. It is painful at first, but not afterwards.[1]

Various mechanical means have been contrived to. cure the disease. Nipple shields, of wood, ivory, or silver, may be procured, which intervening between the child's mouth and the nipple, will often relieve the irritation altogether. But in many cases the child cannot draw the milk through them, and then we may have recourse to "calves' teats," properly prepared, or to a piece of chamoise leather, shaped and protruded in the form of a nipple, and pierced with many holes. If any of these plans succeed, the nipple will heal in a few days, and the child may be again applied to it.

Feeding the child two or three times in the day, or giving it to another person to nurse, will facilitate the cure, provided we do not allow the milk to accumulate too much, in which case inflammation may be excited, and terminate in abscess.

In very few cases is it necessary to give up suckling. Even if our remedies fail, the irritation will generally subside in a fortnight or three weeks.

CHAPTER XXX.

INFLAMMATION AND ABSCESS OF THE BREAST.

866. **Females** are obnoxious to inflammation of the breast during pregnancy, after delivery, and at any period of suckling; but more especially with first children, and during the first three months of nursing.

867. **Causes.**—The irritation and congestion which take place from the secretion of milk vary in amount. If these be within certain limits, the secretion takes place with slight feverishness for a day or two; if beyond these limits, the breast becomes hot, tense and painful, and unless the usual means reduce this external irritation, it will run on into inflammation and abscess. This excessive congestion may be regarded as one of the most frequent causes of mammary abscess, soon after delivery, and with first children. Dr. Burns observes, "Some have the breasts prodigiously distended when the milk first comes, and the hardness extends even to the

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[1] L'Union Méd., 1858.

axillæ. If, in these cases, the nipples be flat, or the milk do not run freely, the fascia, particularly in some habits, rapidly inflames. Others are more prone to have the dense substance in which the acini and ducts are embedded, or the acini themselves, inflamed."[1] Exposure to cold, mental emotion, moving the arms too much at the time the breasts are so much enlarged, are all said to give rise to it. Inflammation very frequently extends itself from the nipples, along the lymphatics, to the deeper tissues, as already mentioned.

868. SYMPTOMS.—The severity of the symptoms will depend upon the depth and extent of the inflammation. When the subcutaneous cellular tissue and the skin alone are involved, there will be some local pain and soreness, with a circumscribed hardness and tension, and a blush of inflammation upon the skin. But when the fascia or gland is involved, the pain is very severe, extending to the axilla ; the swelling considerable, the tension great, and the constitution suffers proportionably. The pulse is quick and full, the skin hot, there are headache, thirst, sleeplessness, etc. The skin covering the inflamed part may be of a uniform red, or red in patches. If the gland be inflamed, the breast has a nodulated feel, as if it consisted of several large tumors. The secretion of milk is, at least for a while, suspended ; but it will take place after the acute stage has somewhat subsided.

After the inflammation has continued for some time, suppuration takes place, and the matter makes its way to the surface. This occurrence is marked by shivering, followed by heat and perspiration, and a sense of fluctuation in the tumor, which is prominent and smooth. The pointing is frequently in the neighborhood of the nipple. By degrees the intervening substance is absorbed, and the cuticle giving way, the matter is evacuated. The matter of superficial abscesses is simple, or, as it is called, "laudable" pus; but when the abscess is more extensive, sloughs of cellular tissue and fascia are discharged. In a healthy person, when the matter has been completely evacuated, the abscess soon heals up, leaving only a degree of hardness for some time.

Such is the general course of the disease; but there are some important variations. "It sometimes happens," says Dr. Burns, "if the constitution be scrofulous, the mind much harrassed, or the treatment at first not vigilant, that a very protracted and even fatal disease may result. The patient has repeated and almost daily shivering fits, followed by heat and perspiration, and accompanied with induration or sinuses in the breasts. She loses her appetite, or is constantly sick. Suppuration slowly forms, and perhaps the abscess bursts; after which the symptoms abate, but are soon renewed, and resist all internal and general remedies. On inspecting the breast, at some point distant from the original opening, a degree of œdema may be discovered—a never-failing sign of deep-seated matter there ; and by pressure, fluctuation may be ascertained. This may become distinct very rapidly, and therefore the breast should be carefully examined at least once a day. Poultices bring forward the abscess, but too slowly to save the strength, and therefore the new abscess, and every sinus which may have already formed or existed, must be at one and the same time freely and completely laid open ; and so soon as a new part suppurates, the same operation is to be performed. If this be neglected, numerous sinuses form, slowly discharging fœtid matter, and both breasts are often thus affected. There are daily shiverings, sick fits, and vomiting of bile, or absolute loathing at food; diarrhœa, and either perspiration, or a dry, scaly, or leprous state of the skin ; and sometimes the internal glands seem to participate in the disease, as those of the mesentery ; or the uterus is affected, and matter is discharged from the vagina. The pulse is frequent, and becomes gradually feebler — till after a protracted suffering of some months, the patient sinks."[1]

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[1] Midwifery, p. 623.

869. TREATMENT.—The first *indication* is to subdue the inflammation, and to prevent the formation of an abscess. For this purpose, the patient may be bled if the fever run high; or a number of leeches may be applied, and repeated if necessary, followed by a large soft poultice, or fomentations. When the bleeding has ceased, the poultice or fomentations may be continued; or an evaporating cold lotion substituted. "A convenient and simple mode of applying warmth is to immerse a wooden bowl in hot water, and having wrapped some flannel around the breast, place it in the bowl. By this means an effectual and equable warmth may be kept up for a considerable length of time."[2]

The bowels should be briskly purged by saline medicines, and their effect is much increased if tartar emetic, in moderate doses, be joined with them. "I have been in the habit of combating this affection in a way first communicated to me by my friend the late Mr. Gregory, who employed it with great success in the Coombe Lying-in Hospital. The remedy to which I allude is tartar emetic, whose power of controlling inflammatory affections of the breast would lead one to imagine that it excited a specific action on the mammary gland. On the accession of inflammatory symptoms in the breast, after purging the patient, I administer this medicine in doses of one-sixteenth of a grain, repeated every hour, so as to induce slight nausea. It is never my object to cause free vomiting; and if this should occur, I omit the medicine for an hour or two, and then recommence its use at longer intervals. In ordinary cases, I usually find, after twenty-four hours, that the pain and fever are mitigated, and the breasts are smaller and softer."[3] Indeed, this medicine has a more powerful effect in abating inflammation of the breast than any I have ever tried. The diet should be bland, and chiefly fluid. The milk should be gently drawn away at intervals, and the breast supported by a sling.

When we find that our efforts are unavailing to prevent the formation of matter, the second *indication* must be fulfilled. We must facilitate it as much as possible, and by no means can it be done more effectually than by constant poulticing—changing the poultice three or four times a day. Opium alone, or in combination with salines, should be given, to lessen the pain and induce sleep.

There is some difference of opinion as to the propriety of opening the abscess when the matter is detected. My own experience coincides with Cooper's rule: "Perhaps, as a general rule, the surgeon should never wait for an abscess of the breast to approach the surface, but make an opening as soon as the slightest degree of fluctuation is perceptible; for if this be not done, and the abscess is not very superficial, the matter will spread, and form sinuses in different directions.[4] Sir A. Cooper remarks: "If the abscess be quick in its progress; if it be placed on the anterior surface of the breast; and if the sufferings which it occasions are not excessively severe, it is best to leave it to its natural course. But if, on the contrary, the abscess in its commencement is very deeply placed—if its progress be tedious—if the local sufferings be excessively severe—if there be a high degree of irritative fever, and the patient suffer from profuse perspiration, and want of rest, much time is saved, and pain avoided, by discharging the matter with a lancet."[5]

When quite superficial, a longer delay may be allowed; but I am quite satisfied that it is better to open them than to allow them to open spontaneously.

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[1] Midwifery, p. 625.
[2] Earle, London Medical Gazette, vol. x. p. 158.
[3] Dr. Beatty, Dublin Journal, vol. iv. p. 840.
[4] Cooper's Surgical Dictionary, p. 946.
[5] Sir A. Cooper on Disease of the Breast, p. 10.

After the matter is discharged, the diet may be improved; and if a considerable discharge continue, tonics may be necessary. The opiate at night may be continued for a short time, and then omitted. If the abscess be small, the child may suck the affected breast; but if large, it had better be artificially drawn, and the infant confined to the other breast. In some cases the child must be removed altogether, as the suckling may lead to abscess in the sound breast. When all inflammation has ceased, but the abscess still continues to discharge, especially in large ones, the cure will be hastened by strapping the breast with adhesive plaster, as recommended by Mr. Phillips, and by Drs. M'Clintock and Hardy.[1]

When sinuses form, the only remedy is to lay them all open. It will require care to prevent the patient sinking. Wine, bark, and good diet will be necessary.

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[1] Pract. Observations, p. 16.

APPENDIX.

"OBSTETRIC MORALITY."

[I HAVE added the following essay as an Appendix because of the importance of the subject, and because I know of no English author who has entered as fully into the subject. I should be very sorry to be regarded as the *advocate* of craniotomy, but I may well contend for its employment in *certain* cases, inasmuch as I have always labored to restrict their number, and to substitute the forceps when possible. The essay is reprinted nearly verbatim from the "Dublin Quarterly Journal," and I have thought it better not to alter its form.]

My attention having been called to an article in the Number of "The Dublin Review" for April, 1858, p. 100, on "Obstetric Morality," I have thought the subject of sufficient importance to bring it before the Obstetrical Society. The article is written to show the immorality of the operation of craniotomy under any circumstances, if the child be alive; and although the question has been repeatedly debated in former times, yet as it is comparatively new to the present generation, it appears to me very desirable that those who are now practising midwifery, and those who are preparing to practise it, should know the precise reasons for admitting or rejecting the operation.

I have read the review over very carefully several times, as dispassionately as I could, and I am free to confess that I am satisfied neither with the theological nor obstetrical reasoning of the author; I strongly suspect, indeed, that the writer is not a medical man.

If any apology be needed for *my* taking up the subject, I trust it will be found in the fact that one of my works (conjointly with Dr. Maunsell's) is taken as the exponent of this "Obstetric Morality." Of the tone of the review towards myself, though somewhat uncharitable in its imputation of motives, I make no complaint; but I should have preferred the third edition of my work being taken as the expression of my present views, instead of the first edition, published sixteen years ago.

In the observations which follow I shall discard all personal feelings, and simply confine myself to the question in debate, and I shall endeavor so to treat the subject as to give no offence to those who may differ from me. In a mixed question like the present, it is perhaps improbable that all should agree, but in differing, it is surely possible that each may give the other credit for the highest motives, and respect him for his conscientious adherence to what he thinks right.

The question at issue, the morality or immorality of destroying a living child by craniotomy—has always been regarded in a threefold aspect, moral, theological, and obstetrical, the latter resting on and inseparably connected with the former, at least in the opinion of one party; so that, although this is not the place for a moral or theological dissertation, nor I the most competent person to undertake it, yet it is impossible to avoid the subject entirely. I shall, however, confine myself to a short statement and examination of the arguments: with this advantage, that the reviewer, having based his theological reasons upon Holy Scripture, an authority to which I implicitly bow, we have, so far, common ground.

I. In the first place, the reviewer objects to the destruction of an unborn babe on the grounds that it is a breach of the sixth commandment, "Thou shalt do no murder;" and also that it is contrary to the denunciation in Genesis ix. 6—"Whoso sheddeth man's blood, by man shall his blood be shed, for in the image of God made He man." If the latter text be more than authorization of capital punishment for murder, which I do not deny, it is clear that it must be subject to limitation, otherwise it would .prohibit killing in self-defence, or in defence of another, which is considered lawful by the Roman Catholic Church, and it would render war unlawful. If, then, it be thus modified, there is no reason why the limitation may not be extended so as to include the operation in question, provided I can show, that it cannot justly be considered a breach of the sixth commandment.

What, then, constitutes *murder*, and in what does it essentially differ from *killing* or *homicide?* For our present purpose we shall derive the best assistance from the law of the land, which is the highest practical exponent of the law of morals. I am indebted to a distinguished legal friend for the following definitions:—"Murder is the killing any person under the king's peace with *malice prepense, or aforethought,* either express or implied by law:" so say Lord Coke, Sir Matthew Hale, Sergeant Hawkins, etc. "Of this description, the *malice prepense, malitia precogitata,* is the chief characteristic, the grand criterion by which murder is distinguished from any other species of homicide."[1] It should, however, be observed, that when the law makes use of the term *malice aforethought* as a description of the crime of murder, it is not to be understood merely in the sense of a principle of malevolence to *particulars,* but as meaning that the fact has been attended with such circumstances as are the ordinary symptoms of a *wicked, depraved, and malignant spirit,* a heart regardless of social duty, and deliberately bent upon mischief."[2]

This malice may be either *express* or *implied by law.* Express malice is when one person kills another with a sedate, deliberate mind and formed design: such formed design being evidenced by external circumstances, discovering the inward intentions, as, lying in wait, antecedent menaces, former grudges, and concerted schemes to do the party harm.[3]

Malice is *implied by law* from any deliberate and cruel act, committed by one person against another, however sudden, thus, when a man kills another suddenly, without any, or an inconsiderable provocation, the law implies malice, for no person, unless of an abandoned heart, would be guilty of such an act upon a slight or no apparent cause.[4]

I think it will be at once admitted that killing a child in utero, which I shall prove can be *by no means born alive,* and which must die in a few hours, but the prolongation of whose life, even for those few hours, will most seriously, if not irreparably, endanger that of the mother, cannot be brought under the definition of murder; there is no malice aforethought expressed or implied; it is done from necessity, and without any evidence of a "wicked, depraved, or malignant spirit:" it is not, therefore, in any true sense murder. Had there been the slightest reason for thinking it so, I have no doubt that there would have been a provision made by law, just as there has been against criminal abortion: so far from this, "an infant in its mother's womb, not being *in rerum naturâ*, is not considered by law as a person who can be killed *within the description of murder*."[1]

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[1] Blackstone's Commentary, vol. iv. p. 198; Gustinean's case, 1 Leach, p. 457.

[2] Justice Foster's Crown Law, pp. 256, 262.

[3] 1 Hale, 451; 4 Blackstone's Commentary, p. 199.

[4] East's Pleas, of the Crown, cap. v. sect. 2, p. 215; Blackstone's Commentary, vol. iv. p. 200.

Killing or Homicide is by law divided into three kinds: it is either justifiable, excusable, or felonious. It is *justifiable* where the killing arises from imperious duty prescribed by law, as the lawful execution of a criminal; or is owing to some *unavoidable necessity*, as in the case of an attack on life, property, or chastity, where the death occurs in self-defence. This is admitted by the Roman Catholic authorities, for I find in a little work, with the imprimatur of the Most Rev. Dr. Cullen, the following: — "It is not a sin to defend your own life or *another's life*, chastity, or property of great value, when unjustly attacked, even though it cannot be defended without taking away the life of him who attacks it."[2]

It is *excusable* — 1. In case of death by accident, without any culpable neglect or default, and whilst engaged in lawful occupation or amusement. 2. When death occurs in protecting one's self from an assault, or the like, in the course of a sudden affray, where the slayer had no other probable means of escaping from his assailant.

It is *felonious* in the case of murder or manslaughter.

Now I shall be able to show that craniotomy, under proper circumstances, is "an unavoidable necessity," and if, therefore, it be legally justifiable to take one life for the protection of another, we have precisely the conditions applicable to our case, with this additional justification, that the life we take is forfeited, *i. e.*, it will inevitably cease, as the child *cannot* be born alive.

It is the more important to be satisfied on this point, for it is clear that, so far as craniotomy is concerned, it must be decided on moral grounds, inasmuch as, whether the child dies in utero or is killed, *baptism is equally out of the question.*

There is an argument frequently used by the reviewer,—"that we are not to do evil that good may follow," about which a few words may not be amiss. It is perfectly true, as an aphorism, but, used as the reviewer uses it, it is a *petitio principii*, for the "evil" is the very point in dispute. Again, what is meant by "evil?" Pain is an evil, yet we inflict pain to save life, —"doing evil that good may come." That, therefore, cannot be the meaning. It must be moral evil, something involving guilt, which would be unlawful.

Moreover, in the way in which it is applied by the reviewer, it is an accusation by implication, "we may not do evil," etc., which is what *you* propose to do. It may "be slanderously reported, and some may affirm that we say, Let us do evil that good may come;" but in the true sense of the word "evil," we repudiate the principle as strongly as the reviewer or the Roman Catholic Church.

II. But the second and graver objection, and one that seems to underlie the former, is, that in destroying the fœtus in utero we destroy both soul and body, because it cannot be previously baptized. It is only fair to give the reviewer's own words on this subject: — "It is no less certain that this soul, which has been created by God, and infused into the body at the first moment of existence, has, in the language of holy David, been conceived in iniquities, that is, that it has inherited the stain inflicted on all his posterity by the prevarication of Adam. Nothing defiled can enter into heaven, and the defilement of this soul can only be washed out in the waters of baptism. To it, in common with all mankind, have been addressed the words of the Saviour, 'Unless a man be born again of water and the Holy Spirit, he cannot enter the kingdom of heaven.' It is strange that those who profess to be guided exclusively by Scripture should deny that the external rite of baptism is necessary to salvation, for it is plainly and repeatedly inculcated in the Word of God. That the second birth by water and the Holy Ghost, spoken of in John iii., means the external rite of baptism may be inferred from the fact that our Lord's disciples soon after began to baptize, as we learn from the beginning of the following chapter. The word 'to baptize,' signifies 'to wash:' and on the very last occasion on which our Lord addressed His Apostles after His resurrection, He told them: "All power is given to me in heaven and in earth. Going, therefore, teach ye all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost.' When the people were melted to compunction of heart by St. Peter's first sermon, they asked what they should do? 'But Peter said to them, Do penance and be baptized, every one of you, in the name of Jesus Christ, for the remission of your sins. They therefore that received his word were baptized.' That this baptism was by water is manifest by what occurred when Philip preached Jesus to the eunuch; for 'as they went on their way, they came to a certain water, and the eunuch said, See, here is water, what doth hinder me to be baptized? And they went down into the water, both Philip and the eunuch, and he baptized him.' Ananias told St. Paul, when sent to him by God, 'Rise up, and be baptized, and wash away thy sins.' So also, when St. Peter saw the Holy Ghost falling on the Gentiles, he exclaimed, 'Can any man forbid water, that these should not be baptized?' This idea is strongly conveyed in various places by St. Paul. 'Christ loved the Church,' he says, 'and delivered himself up for it, that he might sanctify it, cleansing it by the laver of water in the word of life.' Again, he calls the 'laver of water,' the 'laver of regeneration, and renovation of the Holy Ghost,' alluding manifestly to our Lord's words (John iii.), and thus clearly establishing that the regeneration, without which no one can enter into the kingdom of God, is baptism by water. 'Not,' he says, 'by works of justice which we have done, but according to His mercy he saved us, by the laver of regeneration, and the renovation of the Holy Ghost.'" — p. 125.

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[1] 1 Hale, P. C., p. 433.

[2] "What Every Christian must Know and Do." p. 28, note.

Now, putting aside the question of when the soul is first joined to the body, on which subject Holy Scripture is silent, I am quite prepared to admit simply and implicitly the authority of the texts quoted. I do not deny that baptism was by water, nor that baptism is one of the sacraments "generally necessary to salvation;" but all these texts involve one condition, viz., the *possibility* of baptism. This, I think, must be admitted *primâ facie*, and I object to apply such texts to cases for which we have no shadow of proof that they were intended. It appears to me that the blessings of baptism, and the penalties for its neglect, can be and were intended only to apply to those children whose baptism was possible. The duty and the power must be correlatives. Now of children dying in utero nothing whatever is said in Holy Scripture, yet my reviewer deduces, from the texts above quoted, the doctrine that the souls of such children are lost. As I have said, I cannot give him textual authority for the contrary, but I can adduce an example which proves my point completely. When the thief on the cross said, "Lord, remember me when thou comest into Thy kingdom," the answer was, "This day shalt thou be with Me in paradise." Of *his* salvation, therefore, there cannot be the slightest doubt, and yet—he was not baptized.

Of course, if the reviewer had stated that the operation of craniotomy had been prohibited by the Roman Catholic Church, there would have been no necessity for argument.[1] The members of that Church would feel bound by its decision, and it would have been no business of mine to contest the point; but as he has made it depend upon reasoning from Holy Scripture, I have felt quite at liberty to question the accuracy of his conclusions.

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[1] I do not pretend to determine the exact authority of the following extract, although it is not improbable that it may have been the "exciting cause" of the review: — "Sedu-

The teaching of the Church of England and Ireland on the subject of baptism is to be found in her Book of Common Prayer, and is so accessible, and indeed so well known, that any detail is quite unnecessary here. She recognizes baptism as one of the sacraments "generally necessary to salvation," and declares that "it is certain by God's Word, that children which are baptized, dying before they commit actual sin, are undoubtedly saved." But in accordance with her declaration that "Holy Scripture containeth all things necessary to salvation: so that whatsoever is not read therein, nor may be proved thereby, is not to be required of any man that it should be believed as an article of the faith, or be thought requisite or necessary to salvation:" not having found any expression as to the result to those dying unbaptized, when baptism is impossible, she is silent, content to leave their future lot to the loving-kindness and tender pity of Him who died for all.

Morally and theologically, then, the case stands thus: — My reviewer contends that destroying the child in utero is murder. I have proved, on the highest legal authority, that this stigma is unjust, and that it does not come under any true definition of murder, inasmuch as it involves no malice; that it is even something less than justifiable killing, inasmuch as the child's death is inevitable without our interference; we do but hasten it.

Again, he maintains that baptism being a sacrament essential to salvation, all children dying or destroyed in utero are lost. I say, on the contrary, that his authority from Scripture fails, inasmuch, as in the cases quoted baptism was possible; whereas in these it is not whether the operation be performed or not: and I have given one undoubted instance of salvation without baptism, where its administration was impossible. For my own part, whilst I feel the tenderest regard for the lives of these innocents, and would do my best to preserve them, if that fail, I have no fears for their souls for whom Christ died, but look forward with sure and certain hope to their resurrection to eternal life.

III. Now let us turn to the obstetrical side of the question: and our first endeavor must be to recognize, and in recognizing to define, the limits

lam operam dent sacerdotes, ut quantum poterunt, impediant nefandum illud scelus quo, adhibitis chirurgicis instrumentis, infans in utero interficitur. Omnis fœtus quocunque tempore gestationis editus, baptizetur, vel absolute, si constet de vitâ; vel sub conditione, nisi evidenter patent eum vita carere."—*Decreta Synodi plenariæ Episcoporum Hiberniæ, apud Thurles habitæ anno* 1850. Article "De Baptismo," p. 20.

On the other hand, authorities are not wanting to justify the limited use of the operation. For example in the learned work of Migne, "Theologiæ cursus completus," (Paris, 1839), at page 483 of vol. xiv., in a note we read as follows concerning remedies likely to cause the death of the fœtus: — "Dicebit administratio remedii, ... si nulla spes affulgeat prolem baptizandi, nam salus matris ad minus tanti est quam salus temporalis et momentanea prolis, imo magis preponderat; illicitum erit, si spes probabilis affulgeat baptizandi prolem."

Again, if we turn to the works of St. Thomas Aquinas (Paris, 1839, vol vi. p. 253) we find this sentence: — "Si certum esset, non adhibito remedio, fœtum cum matre periturum, et e contra certum aut probabile, adhibito remedio, matrem salvavi vi, multi existimant quod tunc liceret adhibere remedium, quia in his circumstantiis vix in æstimationem venit salus prolis certo perituræ, indeque jus habet mater sibi consulendi." It is only fair to say that St. Thomas is himself doubtful on the point, but it is quite enough for my purpose that "multi existimant."

Lastly, St. Alphonsus Liguori, in his "Homo Apostolicus," 1837, p. 186, says:—"Puto omnino tenendum . . . præbere medicinam matri cum periculo fœtus animati licere in eo solo casu, quo nulla spes appareat rationabilis de prolis vitâ, ut possit baptizari, post matris mortem."

Now, one of two things is certain, either that I do not deserve the hard epithets the Reviewer has bestowed upon me with so liberal a hand; or that they apply with equal justice to these authorities.

of the responsibility devolving upon the accoucheur, both as regards the child and the mother.

No man possessed of common human feelings, particularly if he have children of his own, can fail to feel the utmost tenderness towards the feeble being he is to usher into the world. Even if we leave the soul out of consideration, the fact of a human life being involved will be sufficient to insure the utmost efforts of skill and attention. The accoucheur is responsible that no hygienic arrangement shall be neglected, no errors of management committed, and no assistance withheld, either during the labor or afterwards, which may tend to secure life and health to the child. The records of modern practice show how steadily this object has been kept in view. The improved management of the first stage of labor has shortened the duration of the second, by the prolongation of which the life of the child is threatened. The action of the second stage, when too tedious, is often quickened by the ergot of rye, and we are saved the necessity of a recourse to instrumental assistance. And when we are obliged to assist in this way, I am certain that in every case where there is a posssibility of success, those instruments are preferred which involve no necessary injury to the child. A comparison between the relative frequency of operations with the forceps and crotchet at present and in former times, both in the Rotundo and other hospitals, will bear out the truth of this remark. And in all the modern text-books, this rule is emphatically laid down. For myself I can truly assert that I have always taught this in my lectures and in my writings, and in practice I have rigidly followed the same principle, that the child is to be saved, if possible. I therefore demur to the reviewer's sweeping assertion that we evince great indifference to infantile life. The saddest consummation of an anxious attendance is the necessity of *hastening* the death of an unborn babe, in order that the mother's death may not be thrown upon us also.

But although the reviewer says little about it, we must not forget that we are equally responsible for another life, the mother's, and that of immeasurably present value to her family and to society; and special precautions are accordingly taken. Much of the care to which I have alluded is equally for the benefit of the mother, and if some risk be occasionally incurred to secure a living child, extraordinary care is taken to render that risk as small as possible. The responsibility does not terminate with delivery, but extends until complete recovery. For one moment just look at the interests involved in this recovery. The husband, whose happiness is bound up in the life of his wife, and who has intrusted that to us; other children, it may be, whose well-being is dependent upon their mother; to say nothing of a circle of friends and dependents who look to her for comfort and guidance; and all these interests now hanging in the balance, form very onerous items in our calculations of responsibility.

Such responsibility we incur every day, in every case, but it is only felt as a heavy burden in difficult or impracticable cases. Then we feel that there must be some limitation to it, inasmuch as our power is restricted: we do not hold life and death in our hands—we do not determine the character of the labor. What, then, are those limits beyond which our responsibility does not extend? It appears to me, that *our responsibility is exactly in proportion to our command of the essential conditions of success.* Not that we are responsible for success, for that depends upon a Higher Power; but that, as far as we are concerned, all the means of success within our control shall be applied in a manner and at a time most likely to insure it. Now the first and most essential condition, both for the mother and the child, is *timely delivery*, and if we have the power, we are responsible for its exercise in such a manner as will benefit both. Suppose, for example, a case of powerless labor, suitable for the forceps; if we carelessly allow the labor to continue so long as to involve the death of the child, we are as much responsible for its death as if we had had recourse to destructive instruments, instead of delivering it by the forceps.

But if it be *physically* impossible that the child can be born alive, then I hold that the accoucheur's responsibility for its life ceases entirely,—no blame can rest upon him for its death. Nor do I believe that he can be held responsible in the ordinary meaning of the term, although, in the case supposed, he has to hasten the child's death to secure another life, for which, so far as delivery is concerned, he is unquestionably, and in the fullest sense of the word, directly responsible.

For I would beg you to consider seriously the different position in which we stand as regards delivery, towards the child and towards the mother. Delivery is essential to the safety of both; it *may* be incompatible with the life of the child, but it *can* always be accomplished before the life of the mother is seriously compromised. Having, therefore, the command of the essential condition of success, the full responsibility rests upon us, that so far, the mother's life shall be insured; and as all responsibility for the child has ceased, we say that the mother becomes our sole object.

It is the due appreciation of these relative responsibilities in difficult cases that distinguishes the wise and experienced accoucheur: he preserves a just equipoise between them so long as it is possible to fulfil both, and recognizes the proper moment when one ceases. *One*, I say, not *either:* for I protest, as strongly as my reviewer, against the notion which he attributes to *us*,[1] that we *choose which of the two lives we shall save*, a notion as false in theory as it is in practice. No man *dare make such a choice*, for we have neither the necessary knowledge, nor the right, nor the authority, to decide which is the more important life, and best worth preserving.

And *no one ever does make such a choice.* Perhaps the least suspicious evidence I can adduce is to refer to the cases to which, in my own book, the operation of craniotomy is said to be applicable. You will find that, in all, the child is either presumably dead, or the labor is mechanically impracticable with safety to the child. So that, without hesitation or limitation, I would lay it down as a canon, that *craniotomy is never to be contemplated when a living child can, by any means compatible with the safety of the mother, be delivered "per vias naturales,"* and upon this rule I invariably act.

This rule happily limits the number of such painful cases; yet, although not numerous, instances do occur in which I believe craniotomy to be not only necessary and justifiable, but imperatively demanded, even though the child be alive, if we would not voluntarily incur the responsibility of the mother's peril, and perhaps death; and upon this class of cases I shall trouble the Society with some observations in answer to my reviewer. He especially refers to cases of mechanical disproportion from narrowness of the pelvis, and from a hydrocephalic head. Both these classes, and some others, involve merely questions of mechanical disproportion, and may, for our present purpose, be treated together; but I shall add a few words separately on hydrocephalic children.

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[1] The reviewer states that "this seems to have been the opinion of the French doctors who attended the Empress Maria Louisa during her accouchement, for they consulted the first Napoleon as to whether they should spare the mother or child in case they found it necessary to kill one of them." I believe that this is about as true as the phrase attributed to General Cambronne.—"Les guides meurent mais ne se rendent pas;" or Wellington's "Up, Guards, and at them," both of which were denied by the supposed authors. In truth, M. Dubois was too experienced a man to make such a speech; if anything *like it* was made, it was, probably, a request to know whether the mother was to be *allowed to die, because the child could not be born alive.* And let me just remind the reviewer, in any case, that the parties were of his own Church.

Now in order to meet the question fairly, I shall *assume* that we have to deal with the case of a pelvis so narrowed at either brim or outlet that a living child, even aided by the forceps, cannot pass, but through which a mutilated child can be extracted, without undue risk of injury to the mother; and it matters little to the argument whether the difficulty be from deformity of the bony tissue, from a fixed irreducible tumor, or from excess of bulk on the part of the child. I say I must *assume*, for the sake of the argument, such a case, although I am met at the outset by the objection on the part of the reviewer, that in practice we cannot be sure of such cases, for that there is little certainty, and no uniformity, in the measurements given by authors; that, in fact, they are not agreed about the size of the aperture through which a living child *cannot* pass. This is certainly true, though the difference is not great, and it is a difficulty which would be seriously felt in many cases if we had to give an opinion *à priori*, or before the commencement of labor. But after labor has commenced, the position of the accoucheur is quite changed, and he has acquired new and decisive means of forming a correct judgment. He can compare the size of the aperture with the size of the child's head, for they are in close apposition: he has the evidence of what hours of strong pains can do towards forcing the head downwards; nay, more, he can test the applicability of the forceps, whether they can be introduced, and whether, when introduced, he can draw down the head. With these advantages I undertake to say that no man will find any difficulty in deciding whether a patient can be delivered without craniotomy or not.

Let me now remind you of the course of a labor of this kind when left to nature. During the *first stage* no bad symptoms appear, nor for some time after the commencement of the *second*, nor is the child in present peril; but after a time somewhat varying and uncertain, indications of constitutional suffering are developed,—the symptoms of powerless labor, in short,—and from that moment the mother may be said to be in danger, which is fearfully increased by every hour's delay and suffering. In process of time the symptoms become still more formidable, and involve so much general derangement that the evil effects continue after delivery: and if this be not effected, the patient will ultimately die in a state of coma or convulsion, or, perhaps, before this final stage, the walls of the uterus may give way whilst we are waiting, and death result from the laceration. If the woman be delivered within a reasonable time after the setting in of unfavorable symptoms, they shortly disappear, and her recovery will, in almost all cases, be complete. If the labor be allowed to continue, and exactly in proportion to the delay, the recovery will be less favorable, and the danger after delivery greater, until we arrive at that point of time when delivery itself cannot save the mother. At what period of the labor the death of the child, which is inevitable, will occur, it is impossible to state with any accuracy. It does, doubtless, sometimes take place comparatively early, perhaps before any very bad symptoms have set in; but I feel little doubt that, as a general rule, it is not until a much later period, in fact not until the mother is in imminent peril, in many cases not until the last stage.

Now, what is the right and proper thing to be done in such cases? The child we shall assume to be living, but it is physically impossible to extract it alive through the passages. The mother is in great danger, which increases rapidly, and they will inevitably both die if left alone. We may (at least for the present) dismiss the question of baptism, as that is impossible, whether we craniotomise or not, and there are two courses open to us — 1. To wait until we may reasonably suppose the child to be dead, and then perforate and deliver, regardless of the consequences to the mother; or 2. To perforate as soon as the bad symptoms set in, after having assured ourselves of the impossibility of using the forceps, and so secure the life of the mother. The reviewer indicates a third method, the Cæsarean section, which I shall examine presently. In our choice of these last two methods the reviewer and I are at issue; the conclusions at which we arrive are diametrically opposite. He chooses the first, and rejects craniotomy so long as the child is alive. "But it will be said," he observes, "must the accoucheur fold his arm and allow both mother and child to perish, when he might probably save one of them? To this we answer, once more, that he cannot commit murder; that he must not do evil in the hope that good may follow; and that the medical man, like every other member of society, must be prepared to encounter in this dim world a great many calamities which he can neither remedy or alleviate." Now I have shown that we do not commit murder. I agree fully in the rule that we are not to do evil that good may follow, but the reviewer's use of it in this place is plainly a "*petitio principii*," for I deny that we do evil, that is, morally, or involving guilt; and that "doctors have to encounter many calamities in this dim world which they can neither remedy or alleviate," is undoubtedly true, but *is* this a case in which the doctor can shelter himself under the comfortable conclusion that "he can neither remedy or alleviate it?" Is it not quite evident that his voluntarily refusing to deliver makes him an active, willing and responsible accomplice in the death of the mother?

I have no hesitation in stating my deliberate opinion, that the second plan, which has received the sanction of the best and most distinguished men in the profession, is the right and the wise course to adopt, and the one which best adjusts and preserves the balance of our responsibility. For, in the first place, I have proved that the destruction of a child under such circumstances is not murder, but justifiable in law. Nay, if you think a moment, one cannot say that the blame of the child's death rests upon the accoucheur at all, for that is inevitable if he do nothing. All he is justly answerable for is of depriving it of life a few hours before it would otherwise cease to live. And for what? The mother is in imminent danger, and will die if assistance be withheld, but she *can be saved now.* I say, therefore, if this assistance be not given, the accusation of murder (by omission) would come with greater force against the party who voluntarily allows the mother's life to be imperilled. Take lower ground, if you like, than the abstract question of right. Granted, if you please, that hastening the child's death is an evil: so is the death of the mother: which of the two is the lesser evil, considering that you *cannot* prevent the first, and *can* prevent the latter?

No good man will forget that for all his deeds he is responsible to God; but for our profesional actions we have the additional tribunal of professional and public opinion. Narrow the circle still further, and it is clear that each of us is specially answerable to the party who has intrusted us with the lives most dear to him. The latter has the most direct and deepest interest in both the objects of our care, and it appears to me that it is impossible to ignore *his* right to be a party to whatever decision we come to.

Suppose it to be our painful duty to announce to the husband that the labor is such that the child *cannot* be born alive, but that it must be destroyed if we hope to save the mother; nay, that if we wait until it die, the mother will only be so much the worse. Are there many husbands that would hesitate? Would not natural feeling and common sense lead him to decide that, the child's safety being impossible, the mother's safety should be secured? If this be the case, the accoucheur who refuses to act must be prepared to meet the responsibility he thus incurs towards society. Admitting fully that a man's conscience must be his guide, I do not think in a case like the present he can always be at liberty to ignore the consciences of others.

I have thus endeavored, I hope not unsuccessfully, to define the position in which we stand as regards the mother, in cases where the child cannot be saved. I have shown the responsibility which has ceased for the life of the child, has thereby, as it were, doubled in behalf of the mother; that quiescence on our part cannot be considered as a submission to necessity, or to the decrees of Providence; but that, whether we interfere or not, we are equally voluntary, intentional, and active agents. That in hastening the death of the child, we in no sense incur the guilt of murder, nor are we fully responsible for its death, which, with or without our interference, must have ensued; but that if we, by waiting for its death, imperil the mother, we are in the fullest sense responsible for that result.

But at this point I am met by the reviewer with a quotation from my own statistics to show, that the gain to the mother is not so great after all; for that 1 in 5 die after craniotomy. No doubt this is a very large mortality; but if the reviewer had been a medical man, or if he had taken the trouble to read the next sentence in my book, he would have found it explained as in many cases the result of the doctrine he is upholding, viz., the waiting until the child is dead, and the consequent increase of peril to the mother. In many cases, doubtless, the delay is voluntary; in others it arises from ignorance on the part of the poor, so that, when assistance is procured, the patient is too far gone for ultimate safety. I should be very glad to furnish a table of cases without complication, in which the operation was performed before the patient was too far reduced; but I fear that I shall not be able to adduce many. In Dr. Collins' Life of Dr. Joseph Clarke are given the records of his private practice, and I find that he performed the operation twelve times from mechanical disproportion (including one case of hydrocephalus), and all the mothers recovered favorably; yet the reviewer specially mentions that, of the same operation performed in hospital under Dr. Joseph Clarke, 1 in 3 of the mothers died; an ample confirmation of the explanation I have given.

In Dr. Robert Lee's "Cases in Midwifery" there are eighty cases of craniotomy recorded, under similar conditions to those I have indicated, viz., mechanical disproportion without complication, although Dr. Lee was not called in many of them until too long a time had elapsed; but, even so, only 4 died, or 1 in 20. Dr. Lee's character is a sufficient guarantee that the operation was the patient's only chance, and he expressly regrets that some of them were not delivered earlier; had they been, probably none would have died.

In the record of Mr. Cross' practice, there are 7 cases in which craniotomy was performed, and all the women recovered.

Dr. M'Clintock has met 5 cases in private practice in which the operation was required from disproportion, and all the mothers recovered.

In looking over my own case-book I find that I have never performed the operation in consequence of mechanical disproportion, in my own private practice; the only cases being two of excessive hemorrhage, in which, there being no doubt of the child being dead, this operation was preferred to turning; and one case of convulsions, in which the child was already dead. But in consultation I have had recourse to craniotomy in twenty cases, shortly after it became evident, either that the child was dead, or that it *could not* be born alive; of these, all the mothers recovered well. In four other cases I was called in after the labor had been so protracted that the mother's case was hopeless, and the operation did not save them; these, therefore, I exclude.

From these cases, though their number is more limited than one could wish, I think we may fairly conclude that if the operation be performed as soon as it is imperatively demanded, and before the mother is run down, it is not attended with greater danger than must always be anticipated from any great operation, for it appears that out of 124 cases, some of which were unduly prolonged, only four women died, or 1 in 31, *i.e.*, 3 per cent. Nay, more, Dr. M'Clintock showed, at a recent meeting of this Society, that of the two modes of delivery, by the forceps, and by craniotomy, the latter, *cæteris paribus*, is the safer for the mother.

With regard to M. Debreyne's experience, quoted by the reviewer, that "it is almost always fatal to the mother," if it be more than one of the loose expressions occasionally used by writers, I can only say that it speaks volumes against M. Debreyne's practice and that advocated by the reviewer, for I have shown that the excessive mortality results from unreasonable delay.

Now let me say one word upon children with hydrocephalus. These cases come under the same law as those of which I have been speaking, *i.e.*, the law of disproportion or of relative bulk. The reviewer declaims strongly against perforating them, because, as he says, such children have been born alive. No doubt this is true, but the cases are few; in the greater number the child is dead, or has been necessarily destroyed. But their life or death does not determine the use of the perforator; if the head be not too large to pass through the pelvis, we should no more think of destroying the child than if it were deformed in any other way: if, on the other hand, it cannot pass, it must be opened for the same reasons as we perform craniotomy in distorted pelvis. Probably the reviewer was not aware that such cases, when let alone, involve serious danger to the mother: yet of seventy cases collected by Dr. Keith, in sixteen there was rupture of the uterus and death. The same result followed in five cases related by Dr. R. Lee.

So far, I have assumed that we have only a choice between the two methods of dealing with these cases: that there is no alternative but destroying the child, or allowing it to die; but the reviewer maintains that there is, and, if I understand him, that it ought in all cases to be the substitute for craniotomy. He says that "when it has been proved by *experience* and to an absolute demonstration, that a full-sized child cannot be born alive, the induction of premature labor ought undoubtedly to be adopted. The only lawful alternative is the Cæsarean section, and this itself is so formidable and dangerous, that, when it can be foreseen, and its necessity avoided by any lawful and less dangerous means, it is an undoubted duty to have recourse to them." That is, for every present impracticable labor we are to have recourse to the Cæsarean section; but for any future ones in the same woman to the induction of premature labor. I perfectly agree with the reviewer, that for all cases of obstruction for which I have recommended craniotomy, and he the Cæsarean section, premature labor ought to be advised in subsequent pregnancies, and this doctrine he found in my book, if he read it. At the same time, I cannot but congratulate the profession on finding the Dublin Review an advocate for the induction of premature labor: it is a sign of progress very encouraging to us, for the reviewer must be aware that this conservative operation was first proposed by those Protestants, upon whose alleged disregard of infantile life he is so severe; and also that for years it was opposed in France, Italy, and Germany, by the Roman Catholic clergy. Even so late as 1827, M. Capuron, a distinguished and devout practitioner, characterized it as "Un attentat commis envers les lois divines et humaines."

Now let us consider the Cæsarean section as a substitute for craniotomy.

The reviewer bases his conclusions upon the statistics given in my book. The entire number stated is 423, of which 231 mothers were saved, and 192 lost, or about 1 in 2⅓; of 238 children, 167 were saved, and 71 lost. Let me observe that, although I have collected this number, I am far from pledging myself to the trustworthiness of the persons by whom they were recorded. The incomplete account of the children also is a great drawback, as our statistics might be altered if we knew what became of the remainder.

If we inquire a little further, we find that M. Figueira has collected 790 cases, of which 424 were fatal to the mother, or considerably more than one-half, but say 50 per cent.

Again, Dr. Arneth mentions that M. Kayser collected and analyzed 338 cases, of which 210 proved fatal to the mothers, or nearly 2 out of 3, but say 60 per cent.

Moreover, if we take the cases which have occurred in Great Britain and America alone, I find, out of 63 cases, 18 mothers were saved, and 45 lost, or nearly three-fourths, say 70 per cent. In 60 cases, where the result to the child is mentioned, 34 were saved, and 26 lost, or, 1 in $2\frac{1}{3}$.

Thus we cannot in fairness take the more favorable statistics as a ground of our proceedings: we must either strike an average, or, where that is impossible, base our calculations upon the lowest. Now, according to Figueira, we shall lose more than one-half; according to Kayser, two-thirds; and according to British and American experience, nearly three-fourths; whilst of the children we may, under similar circumstances, possibly save one-half, — I say possibly, because, as the result to many of the children was not noted, it *may* as well be less as more.

Let us go a step further. It is well known that, of late years, the cases have been more carefully selected in these countries, and in many ways have been managed by *previous preparation* both of the patient herself and of suitable means and appliances, which require time and foreknowledge. To show this, take the cases that occurred in Great Britain and America before 1830: 35 such cases will be found in the Table I have given, of whom 30 died and only five recovered, or 1 in 7; *i. e.*, $\frac{6}{7}$ths, or 86 per cent. of the mothers were lost; more than one-half the children were saved.

So far, then, we find that a more minute analysis has not improved the mortality after this grave operation: we see that it varies from one-half to two-thirds, three-fourths, and six-sevenths of the mothers, and about one-half of the children: whilst we found that a careful examination of craniotomy reduced the mortality to 1 in 31. That is, you lose 1 mother in 31 after craniotomy, and all the children; but in the same number by the Cæsarean section, you would lose about 16, 20, 22, or 27 mothers, and save 16 children. Or, taking the lowest of these figures, and admitting for a moment the lives to be of equal value, out of 31 cases, or 62 lives, you save 30, which is exactly the number of lives that would be saved by craniotomy, if my calculations are right. If we take the higher numbers, the saving of life will be reduced respectively to 27, 25, and 20, in 62. And, moreover, we should not forget that, whereas craniotomy is an operation of *necessity*, not election, we shall have voluntarily *chosen* this operation, and have knowingly incurred this fearful destruction of mothers. To any person thus acting, the reviewer's words will cease to be ironically severe, and become simply descriptive. "And if we may sacrifice one life to save the other," he says, "if we may sacrifice the less important to save the more precious, we may, of course, occasionally kill the mother to save the child, because there are many circumstances in which the life of the latter is much more precious than that of the former."

After what I have said, I think, we shall hardly be prepared to agree with the verdict of the reviewer, that if all the circumstances of both operations were compared impartially, "the advantages would remain on the side of the Cæsarean section, which is much the *easier and simpler of the two.*" Let us examine a little closer into this, as bearing upon practice. One *cause* of a high rate of mortality after the Cæsarian section is, that the patients have often been allowed to remain in labor too long before the operation. One *advantage* has been—and it is essential to success—that the operator has known some time previously that he would have to operate, and has had time in some degree to prepare his patient, to secure suitable assistants, and to get ready various matters which are sure to be required. The *danger* arises, first, from the shock of the operation; second, from hemorrhage; third, and chiefly, from subsequent peritonitis, and this latter risk will be much increased by bad food, bad air, and bad nursing generally, but especially by the prevalence, at the time, of any epidemic.

Now, in substituting this operation for craniotomy, consider the circumstances in which we must almost necessarily be placed, and see whether they are favorable to success or not. They appear to me to combine every disadvantage of the cases of hysterotomy on record, with none of the advantage possessed by the operator in them.

In the first place, so formidable an operation will naturally be postponed to the latest possible moment, on account of its known danger, which will materially diminish the chances of both mother and child. Then, as it is quite impossible, in such cases as we have been considering, that the operator could anticipate its necessity, he will necessarily be unprovided with things requisite, and with assistants; nay, it may be night before he makes up his mind, and he may possibly be in the country, remote from all qualified assistance. Moreover these cases are very much more frequent among the poor than those in comfortable circumstances, and here we have combined the drawbacks of bad air, bad food, and injudicious management, with possibly a prevalent epidemic.

Under these circumstances, what will be the probable mortality? You may unhesitatingly dismiss the hope of saving one-third, or one-fourth, or even one-seventh of the mothers, and half the children; but can you, with any reasonable certainty, calculate in saving one-twentieth of the mothers, and one-fourth of the children? and if not, look at the unfortunate position of the accoucheur,—he has *sacrificed* so many of the mothers to save so small a proportion of the children. May we not fairly characterize this as doing evil that good, and very little good, may arise, which *we* reprobate as strongly as the reviewer.

But allow me to add that, if we are to be guided solely by the desire of delivering a living child, at whatever expense to the mother, I do not see how we can limit the operation to the cases we have supposed — viz., mechanical disproportion. There are others in which we fail in saving the child by ordinary means, where it might indubitably be born alive by means of the Cæsarian section. Take, for example, a case of prolapse of the funis, which you fail in replacing, and where turning is impracticable, and the application of the forceps impossible; the labor being natural, the mother will be delivered without risk, but the child will be dead. Now in this case Cæsarian section would undoubtedly save the child, but *dare any one propose its adoption?* Yet the principle is the same, only pushed a little further.

The reviewer lays much mistaken stress upon the Cæsarian section being "simpler and easier," which he would not have done had his medical knowledge kept pace with his theological. In craniotomy, in the cases we have been considering, no wound or injury is inflicted upon the mother; a mutilated child is forcibly drawn through the passages, and that is all. In the Cæsarian section, on the other hand, the largest serous cavity in the body, and that by far the more sensitive to morbid action, is fully laid open, the uterus is divided, and there will be more or less hemorrhage into the peritoneum. After the operation is over, there is every probability of an attack of peritonitis from the exposure and rough contact with the serous membrane, and this disease is one of the most fatal we ever met in practice.

It must be either ignorance or folly to compare the danger of the operative proceedings of craniotomy with those of the Cæsarian section, as regards the mother. And medical men are aware of and admit this. I know a little of foreign obstetric literature, but I cannot call to mind a single Roman Catholic writer of eminence who has recommended this substitution. I should at this moment be perfectly willing to abide by the decision of a jury of French or Austrian obstetricians of authority on this subject; and, however decided, I can assure the reviewer that he will find no one in this country to take his advice about the Cæsarian section.[1] Any one who should venture to do so would, I have little doubt, find himself put upon his defence before the tribunals of his country, and in the hands of a jury who have wives, and value them.

Allow me to add a confirmation of the opinion I have expressed, in the words of Dr. West, no mean authority, it will be admitted:—"If, then," he says, "such and so many dangers beset this operation, while the causes of that mortality are, for the most part, beyond the power either of surgical dexterity or medical skill to obviate, and some of them inseparable from those processes which needs must follow delivery, we may, I think, feel satisfied that the general rule in British midwifery which prohibits the performance of the Cæsarian section, except where delivery would otherwise be altogether impossible, rests on a far sounder foundation than that of mere prejudice, or blind obedience to the dicta of men eminent in their profession."

I have now gone pretty fully into these important questions; I have shown that hastening the death of a child that cannot be born alive is not murder, as the reviewer has been pleased to term it; but, according to the law of morals and the law of the land, justifiable and right. I have expressed my own faith in the safety of the child's soul when baptism is impossible, whether it die '*in utero*' or is destroyed. I have endeavored to prove that the responsibility of the accoucheur for the child ceases when his power over it fails; but that, in the one essential particular, his responsibility for the mother does not cease, but rather augments, because that condition is within his own control. We have seen that craniotomy is not recommended in any case in which the child can be delivered alive, and that, although the mortality to the mothers is very high where assistance is deferred until the death of the child has taken place, it is comparatively small when afforded in reasonable time.

As to the alternative of the Cæsarian section, I hope I have convinced you that, whatever may be its mortality, when deliberately planned and arranged beforehand, with assistants and all the various appliances necessary, yet that, hurriedly performed, with the patient exhausted with prolonged sufferings, and the operator deprived of the advantages of due preparation, the mortality must inevitably be so fearfully high, whilst the number of children saved would be so small, that were we prepared, as the reviewer is, to sacrifice so many mothers in our endeavor to save the children, the sum total of lives saved would, at the best, not be more, but might very probably be much less than by the operation of craniotomy.

There are two or three points of secondary importance upon which I should like to say a few words, if I have not exhausted your patience. The reviewer states that I mention, as one of the objects of the Cæsarian section, "the extraction of the child so promptly as to give it a chance of life, when the death of the mother has taken place suddenly; and he adds, in a tone of blame,—"But he never again reverts to the subject, so far as we have been able to discover: and, indeed, the teaching of professors of midwifery in these countries has led to the horrible practice of leaving the living child in the womb of its dead mother. *A great many cases have fallen within our own observation*, in which the woman has reached the end of her pregnancy, where the death was sudden, and it was morally certain that the child was alive, and yet it was left in the dead mother's womb, and buried remorselessly along with her."

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[1] Since this remark was published I have seen the question put to the test. In a case of pelvic distortion where the forceps failed, the priest refused permission to perform craniotomy, and brought an accoucheur of his own choosing, who, he said, would deliver the woman without injuring the child. He tried the forceps and failed, and then the original attendant offered to give up the patient to him for the Cæsarian section if he would take the responsibility. This he declined, and they sent the woman to the Rotunda Hospital, where she was delivered by craniotomy.

The quotation from my work proves, on his own showing, that the allegation against the teachers of midwifery does not apply to all; and, from what I know of my fellow-professors, I do not think that it is true of any. I believe most firmly that far less than being "*morally certain* that the child was alive" would induce every teacher and practitioner to give the child the chance of life: and I regret to see in the pages of the Dublin Review what I cannot but believe to be an unfounded slander.

But the reviewer has seen "a great many" such cases of sudden death, etc. Now as he has had free use of my statistics, I call upon him to give me the benefit of his, and to say *how many* he has seen, and *under what circumstances*. I am unwilling to say an uncourteous word of any one, but I must frankly confess that I do not believe this assertion. Sudden deaths at the end of pregnancy, or in the last two months, are very rare; the majority result from accidents, hemorrhage, rupture of the uterus, cerebral affections, or acute disease affecting other organs. Dr. M'Clintock informs me that in the seven years he has been Assistant and Master in this Hospital, he has seen but two cases of death during pregnancy.

I myself have seen two or three women (in consultation or dispensary practice) die undelivered from hemorrhage, and two from rupture of the uterus, but no others, in twenty-six years' practice. Now, in the two latter classes of cases, the operation would be useless, for hemorrhage sufficient to kill the mother would undoubtedly destroy the child; and Dr. M'Clintock has established the fact that the child dies almost instantly after rupture has occurred. I never saw a woman die of convulsions or apoplexy before delivery; but we know that in such cases, when the life of the mother is preserved, the child is often born dead, and I think it very unlikely that it would survive the mother's death. At any rate, the stethoscope would test this, as well as in death from acute diseases; and if the fœtal heart were heard, I think it would be the duty of the medical man to propose the operation; it is clear that the decision does not rest with him. In case of accidental death from violence, I believe every one is prepared to try and save the child, and the probabilities are much more in its favor than in any of the other cases; yet the reviewer ought to know, that of all the cases of this kind on record, in a large majority the child has been found dead.

I cannot help remarking here that, not only in what relates to this question, but to all those he touches upon, the reviewer altogether ignores the husband and father, as necessary to be consulted, or having a voice in the decision. Whether the child is to be destroyed, or whether we are to wait until it dies to the peril of the mother, or whether she is to be opened the moment she is dead, is to be decided by the clergyman or the doctor, but apparently without reference to the person most deeply interested! And yet he has not only the natural right of his relationship, but legal power; for Dr. Lever recently mentioned that he had consulted Dr. Alfred Taylor to know "whether he would be justified in performing this operation without the consent of the father, as it appeared unjustifiable homicide to allow the infant to die? Dr. Alfred Taylor gave his opinion that, in law, the infant belonged to the father, — the infant, "with the life thereof;" and that if Dr. Lever touched it, even to rescue it from death, an action would lie against him. The father in two cases had refused Dr. Lever permission; and in this country although there is a strong feeling against burying the child in the womb of its mother (a distortion probably of the true view), yet I have known permission to extract it refused until it was altogether too late. I confess that, although wrong, one can make much allowance for the feeling which objects to the mutilation (as it would appear) of a wife, instantly after death, and in fact before the husband had been able to realize his loss.

The "moral certainty" of the reviewer seems to me very easily acquired, if he believe all the stories he quotes from M. Debreyne of children delivered alive by the Cæsarian section, after five, twenty-four, forty-eight hours, and three days, or even after the interment of the mother. It would take us too long to examine into the evidence of such miraculous cases, and I, for one, object to take them on M. Debreyne's authority. The reviewer does not tell us the date of his book, and I confess I have not met with it. The position he holds seems equally indefinite; he is "Professeur particulier de Medicine pratique, Prétre, etc.," whatever that may mean; but it would require a very weighty "Professeur particulier" to justify the demands he makes upon our credulity.

Again, the reviewer "reprobates in the strongest terms the language of Dr. Churchill, who confounds the induction of premature labor with the procuring of abortion." Begging the critic's pardon, I do no such thing; I couple the two together, certainly, but they were obviously intended to apply to different cases. If, when the reviewer was so shocked with the paragraph in the chapter on Cæsarian section which he quotes, he had turned to the chapter on induction of premature labor, where the details are given, he would have read thus: — "In the cases I have supposed, the safety of the child is the great object of the operation: and they are limited, therefore, to those patients in whom the pelvis, though deformed, is still large enough to permit the passage of a *viable* child. But there are cases where the *distortion is so great as to render the passage of a seven months' child impossible;* and others still worse, *where no reduction of the child's bulk will enable it to pass.* I do not see why abortion should not be induced at an early period in such cases. The life of the child must inevitably be sacrificed, and the safety of the mother alone regarded; and surely, after the calculations I have adduced, it cannot be pretended that the Cæsarian section, the *alternative* in these cases, offers such a chance to mother and child as would justify our preferring it." I am sorry that the reviewer should have wasted so much virtuous indignation, but it is his own fault. I did not, and do not, propose the induction of abortion as a substitute for premature labor, but in cases in which premature labor, when the child is viable, would be of no use. In those very rare cases of extreme distortion, or after the patient has recovered from the Cæsarian section, performed for extreme distortion; I do say that, to save the mother from the excessive risk of the latter operation by one from which she runs no risk, would be more justifiable and better practice than to allow her to go to the full term. The reasons I have already so fully given apply equally to these cases, so that I need not enter into them again. I do not believe that we endanger the soul of the child; and I have no doubt that the mother's safety will be more fully insured than by any other mode of treatment.

Let me add that of which the reviewer seems ignorant, that the operation was proposed in such cases by Dr. W. Hunter in 1768, and that on the Continent it has been sanctioned by such men as Foderè, Marc, Velpeau, Solz, Jacquemier, Chailly, Cazeaux, Spiegelberg, Scanzoni, etc.

QUALIFICATIONS AND DUTIES

OF THE

MONTHLY NURSE.

[THE following pages are extracted, with the sanction of the author, from a little "Manual for Midwives and Nurses," recently issued by Dr. Churchill. The subjects discussed have already been treated in chapters 3 and 4 of Part III., but the additional details and minutiæ so clearly presented in the "Manual" can hardly fail to prove of value to the young practitioner, when called upon for the first time to take charge of the lying-in room, and to assume the responsibility of giving all the requisite instructions to the nurse.

Having found it desirable to arrange our extracts in somewhat different order from that in which they occur in the "Manual," a few verbal alterations have been rendered necessary to preserve their due connection. With these exceptions, however, no change whatever has been attempted.]

QUALIFICATIONS OF A MONTHLY NURSE.—1. A good nurse ought not only to be a woman of irreproachable moral character, but she ought to have a deep sense of religion. This will lead her to regard her office as a high vocation, the duties of which are to be conscientiously performed for His sake, who entrusted them to her; it will support her under fatigue, and in the midst of scenes of difficulty, distress, and sorrow, will lead her to the only source of strength, and comfort, and wisdom. An irreligious nurse will generally be more or less inefficient.

2. She ought to possess a tender sympathy for the sufferings of others; and, so far from interfering with her usefulness, this will render her efforts more diligent and untiring, at the same time that the gentleness and feeling she manifests will soothe the patient and acquire her confidence.

3. A habit of quick yet careful observation is essential, lest she should overlook some important symptom, or undervalue some unusual occurrence, and so lose the earliest opportunity of affording relief, or of sending for advice and assistance.

4. She should possess a certain amount of education. A nurse who cannot read, cannot be trusted with the administration of medicines without great risk; but a degree of cultivation ensures greater intelligence, and, as they have abundant leisure, they have time for improvement. I can also say, from experience, that a nurse who can read pleasantly has it in her power to beguile many a weary hour for her patient.

5. Neatness and cleanliness should characterize not only her person and dress, but the entire sphere of her duties. The arrangements of the sick chamber, of the bed, of the patient, and of the infant, should all be marked by order, cleanliness, and neatness. A slatternly nurse is generally something worse. She should have "a place for everything, and everything in its place."

6. As tidiness should be the character of her department, so quietness and gentleness should mark her movements and actions. There should be no hurry, no bustle, no fuss. As everything should have its proper place, so every duty should have its proper time and order, that the patient may neither be flurried nor discomposed.

7. A scrupulous attention to the directions of the obstetrician in attendance should be regarded as the nurse's first duty, on no account to be neglected from carelessness, or evaded at the request of the patient or her friends. As she is responsible to him for the faithful execution of his orders, she is so far answerable for the safety and life of the patient. To practice any improper concealment towards the attending obstetrician is a gross injustice to both parties, which may cost the patient her life, and bring irretrievable disgrace upon the nurse.

8. A nurse should cultivate habits of perfect accuracy and truth towards the patient, her friends, and the medical attendant: it is quite possible, and often necessary, to refrain from telling the whole truth to the patient, without telling what is untrue. For the sake of her own health, as well as for the efficient discharge of her duties, she should be temperate in eating; of early, active habits, and of constant watchfulness, so long as she is in attendance upon a patient.

NATURAL LABOR. —The beginning of labor is dated by the patient from the time that the uterine contractions become painful; and this is quite correct, provided that the entire uterus be engaged, and that the pains recur regularly. There is a kind of irregular contractions, however, which are called "*spurious or false pains*," from their teasing the patient without advancing the labor. They arise from various causes, as over fatigue, improper food, constipation, cold, etc., and you will know them by their irregularity, by their commencing at the fundus, or top of the womb, and being of limited extent, by their not being accompanied by mucous discharge or "shews," nor pushing forward the "bag of the waters," nor dilating the mouth of the womb. Whenever you find the pains to possess these characters, you may be sure that they are spurious pains, especially if, as is often the case, the patient have not arrived at the full time; and you had better recommend rest, bland food, and attention to the bowels. If this be not sufficient, the family physician should, without delay, be consulted.

The *true pains*, on the other hand, recur at regular intervals, but these intervals gradually become shorter; in other words, the pains become quicker, and also stronger. And although they begin in the back, generally, they spread round to the front, until the entire womb is contracted and becomes hard. The result of this contraction is, that the "bag of the waters," as it is called, is pushed by degrees to the mouth of the womb, and gradually dilates it: at the same time, there is a pretty abundant discharge of mucus from the vagina. These peculiarities may almost always be observed, even at the beginning of labor, and when you find them, you may be satisfied that the female is really in labor.

As the pains change their character as labor goes on, a convenient distinction has been made into "*cutting or grinding pains*:" and "*forcing or bearing down pains*; the former are confined to the first stage of labor, and are short, piercing, and not very frequent at first; neither does the patient bear down with them, unless, very improperly, she be told to do so. As the labor goes on they increase, and sometimes occasion as much suffering as the pains of the second stage. They cause the patient to cry out, and, perhaps, it is better that she should do so, to a certain extent; but she should be encouraged to control the expression of pain and restlessness within reasonable bounds. A refractory, noisy, restless patient, certainly suffers more than a quiet submissive one.

The "forcing or bearing down pains" are very different, and are very well described by their name. The patient is obliged to bear down, she catches hold of something, stiffens her body, holds her breath, and does most effectually aid the uterine contractions in expelling the child. And whereas, with the grinding pains, the skin was cool and the pulse quiet, but the patient restless and crying out, during the bearing down pain she cannot cry out, because she is obliged to hold her breath; she lies quiet in order to force; her skin becomes hot and bathed in perspiration, and her pulse is quick. Thus, by the state of the skin and the cry alone, you will generally know in what stage the labor is.

You will remember the division I have made of labor into three stages; as a general rule, the waters come away about the termination of the first stage, and so may serve you as a sort of landmark. Now let us mention the principal symptoms which you meet with in each stage. I have just described the pains of the *first stage*—they are cutting, increasingly frequent, gradually becoming stronger, rendering the patient restless and irritable, often low spirited, and requiring soothing and encouraging treatment. During this stage, also, the stomach often becomes irritable, and the patient may be troubled with retching or vomiting, which rather does good than harm, as it relaxes the parts and diminishes the resistance.

During the first stage, shivering is apt to occur, and especially towards its termination, just as the head is pressing through the os uteri. The pulse and skin are but little affected, at least not until near its completion.

If, during this stage, you place your hand on the abdomen, you will feel the womb very hard during a pain, and somewhat softer, though still harder than before labor, during an interval. It is also tilted forward in order to place the child's head in a favorable position for entering the pelvis. Further information will be obtained by an internal examination; but I had better first tell you how this is to be made. The patient should be placed on her left side, with the hips close to the edge of the bed: then, having oiled your right forefinger, you pass it (under the clothes) from behind forward, until you arrive at the external orifice, into which you introduce it, and direct it rather backwards and upwards until you arrive at the os uteri, which will feel like a small ring, and within which you will find the membranes protruding. You must be very careful not to press too roughly, or you will rupture them; but when they are relaxed, you can feel the presenting part through them. Thus you may ascertain if the labor be natural, and how far, it has advanced, judging by the size of the os uteri, and its softness or hardness. If you keep your finger at the os uteri during a pain, so as to estimate its force, and the effect it produces, you may give a shrewd guess whether the labor is likely to be long or short. Of course you will also notice the state of the vagina, whether it is cool or hot, moist or dry, or whether there be any unusual obstruction, etc., and on withdrawing your finger, you will observe the character and amount of the discharge. Remember, this examination is to be with gentleness and delicacy, without exposure or pain, and if all be right, it will not be necessary to repeat it during the first stage.

During the *second stage* the pains become longer, stronger, and more frequent, and are seconded by the efforts of the patient: the pulse is quick, the skin hot, and the face flushed. Vomiting sometimes occurs, but if the labor have not been unusually prolonged, it is neither a bad sign nor injurious. The patient also feels a degree of heaviness or drowsiness, so that it is not uncommon for her to doze between the pains; and this should always be permitted. As the head passes downward through the lower outlet, it presses upon some of the nerves which supply the lower limbs, and causes severe cramps in the thighs or calves of the legs, which may be somewhat relieved by friction.

If an *internal* examination be made during this stage, you will neither feel the bag of the waters nor the os uteri, as a general rule, for the former has been ruptured, and the latter has been drawn upward over the child's head; but you will touch the head (or whatever part presents) directly, and find it filling some portion of the vagina. During a pain you will feel it descend a little, and go back when the pain ceases; but by the frequent repetition of this process, you will observe the head gradually come down, until it fill the pelvis and press upon the perineum. At this time the progress becomes slower, a great many pains seem to cause little advance, and this for two reasons: first, the head has to be adapted to the lower outlet by a change of position and by compression, or moulding, as it is termed; and secondly (especially in first labor), because it takes time to dilate the soft parts.

After the pressure upon the perineum has gone on some time, it begins to yield, and you find it bulge out with each pain, and by degrees the head begins to appear at the orifice of the vagina, pressing forward, then receding, but steadily gaining ground, until with a stronger pain than usual or a double one, it passes into the world, generally with the back of the head directed forwards towards the pubis, and the face of the perineum; but this position almost instantly changes, and the face is turned upwards (most frequently) or downwards. The next pain after the head is born, effects this; and presses the shoulders on the perineum, over which they pass with much less difficulty and delay than the head; and are followed immediately by the body of the child, when the second stage is completed. It is important for you to remember this second pressure upon the perineum, for if proper attention be not paid, the perineum, that escaped injury from the head, may be torn by the shoulder.

After the birth of the child, a short time of rest occurs, and then the womb again contracts, and pain is felt, but not so severe as formerly. This is for the expulsion of the afterbirth, which is generally separated from the womb by the pains, which expel the child, and only needs a further contraction to be removed entirely from the uterine cavity. After the birth of the child, there is always more or less discharge of blood, which continues till the placenta comes away, and then generally, though not always, diminishes. If the interval between the expulsion of the child and placenta be long, the latter will be accompanied by its clots.

If the patient have had children, the pains return in an hour or two, and continue at intervals for a day or more, but they are seldom very bad, and after suckling has been fairly established, they subside. These are called "*afterpains*," and, though unpleasant, are of great use in expelling any clots which may be in the womb, and in preventing hemorrhage. After its contents have been expelled, the womb contracts, and may be felt as a hard tumor at the lower part of the belly, about as large as the infant's head.

DUTIES OF NURSE DURING PREGNANCY.—You are not to regard pregnancy as a diseased state, requiring medical treatment necessarily; on the contrary, it is a natural condition, and needs little more than common sense, in the majority of instances, to conduct it to a happy termination. A certain amount—rather less, perhaps, than at another time—of exercise should be taken; as the stomach is irritable, or at least more easily disturbed than usual, some care should be taken to avoid those articles of diet likely to dis agree; longings, as they are called, may be, to a certain extent, gratified, provided they are not forbidden by common sense; and the dress should be comfortable, according to the season of the year and the weather. I need not say that the personal vanity, which seeks gratification in well-fitting clothes, must give way to the necessity for freedom, looseness, and ease in dress. The stays, for example, should be altered entirely: the front bone or steel should either be removed or exchanged for one much slighter; a gore of elastic should be inserted on each side, so as to allow of expansion; and the breasts should be freed from all possibility of pressure. If the patient intend to suckle her child, she should, every morning and evening, for about two months before her confinement, wash the nipples with soap and water, dry them, and then bathe them with equal parts of brandy and water, or brandy and strong green tea: this will harden the skin, and diminish the probability of sore nipples. The bowels should be carefully regulated, if necessary, not by large doses of medicine, but by moderate ones repeated. Take care and do not mistake: an irritable condition of the bowels, with small, frequent motions for a proper freedom, is quite consistent with large accumulations, and requires medical advice. Powerful purgatives must never be given to a pregnant woman, for fear of bringing on labor. Small doses of castor oil, or Gregory's powder, or Epsom salts, will answer in many cases. The spirits of a pregnant woman are very variable: it will, of course, be your duty to promote cheerfulness, by suggesting to her the many happy considerations connected with her condition, and by abstaining from all unpleasant histories, etc. Quiet and cheerfulness, fresh air and exercise, by promoting the healthy performance of the bodily functions generally, will naturally favor the successful completion of pregnancy. But some deviations from the natural course may occur, some symptoms may arise, which may indicate that all is not quite right; and I wish to caution you against the attempt to treat such yourself. By so doing you will lose time at least, which, in some cases, may result in serious consequences. Whenever, therefore, any unusual or threatening symptom occurs, be the first to advise that a medical man be consulted: by so doing, you will promote your own interest, as well as that of the patient.

PREPARATIONS FOR CONFINEMENT.—At the time you are engaged as nurse, you will be also consulted as to certain preparations for confinement. If possible, you should secure a large airy bed-chamber, a bed with a comfortable hair mattress, with ample means for order and tidiness: let the patient have castor oil in the house, and a sufficient supply of bed linen, napkins, etc. A dressed sheepskin, or a large square waterproof cloth, should be provided, with diaper for binders, strong pins, etc. See that the infant's clothes are correct—with strings, instead of pins; and prefer rather an abundance of inner clothing to external finery.

PRELIMINARY DUTIES OF NURSE.—In most cases you will be summoned before the attendance of the accoucheur is considered necessary, and your object should be, on the one hand, to avoid calling on him unnecessarily early, and, on the other, to make sure that he is summoned in time. In order to decide upon this, you must take into consideration the distance at which he lives, the character of the patient's former labors, the rate of progress of the present labor, and the presentation. If, for instance, it be a first labor and the presentation natural, you may wait until the waters break, or the pains change their character, provided the distance be not considerable. If the former labors were rapid, you must send so much the sooner; and if you discover any other presentation than the head, you must send instantly, no matter how little progress may have been made. To ascertain this, of course you must make an examination in the way I have described, but, having done so, it will scarcely be necessary to repeat it, as the change of pains and of outcry will inform you when the second stage begins, and the doctor should then be in attendance.

On your arrival at the patient's house, you will ascertain her present state, and not put her to bed, unless for examination, during the first stage.

If labor be only beginning, and it the day time, she had better not remain in her bedroom, but leave that to be aired and settled. Or, if she remain in her room, it should be kept fresh, and every thing in it arranged in a clean and orderly manner. The various things that are likely to be wanted, such as sheets, napkins, hot and cold water, baby's clothes, etc., should be placed within reach, and aired, if necessary. The binder, pins, ligatures, and scissors should all be ready, and the bed properly made up. All this may be done neatly and quietly, without hurry or parade. Hurry and fuss will agitate and disturb the patient, and your object should be to cheer, comfort, and encourage her. She will, no doubt, be very glad to talk to you, and if it be her first time, to find out from you something about what she has to go through. If all be right, you have an opportunity of encouraging her, but I would advise you rather to avoid details. Above all, neither tell her the histories of other patients, nor make promises as to the period of her being well; as if she once find out that you have been mistaken, or have been deceiving her, it will depress her, and she will put no further trust in any thing you tell her. And further, let me add a caution against gossiping, either with the patient's friends or servants, about any thing you may have seen or heard in other families; it will certainly be repeated, and you will inevitably get into disgrace. A nurse is necessarily a confidential person, above a servant, and trusted with many things as a friend; and she should conscientiously regard as sacred all the information she may obtain when professionally employed. I have known several excellent women much injured by a neglect of this rule. A cheerful, kind, and genial manner, marked by respect for others, and therefore for yourself, with orderly, neat habits, and confidential trustworthiness and truth, are principal recommendations in a nurse-tender.

But to return: on your arrival, you should ascertain that the bowels have been recently moved, or if not, give medicine or a plain enema of warm water or thin gruel, and throughout the labor take care that the patient pass water at intervals. On the arrival of the medical man, of course the patient is in his hands, and you receive your orders from him. Your chief duty will be to have everything at hand which he may want, so that there may be neither delay nor hurry.

Management of Labor.—During the first stage of labor there is not much to be done. You will probably be called at the beginning, before the patient is very bad; and it is not necessary, especially if it be in the day time, that she should go to bed immediately, as you will probably find the pains stronger and more frequent while she is sitting up. She may walk about the room a little, and occupy herself, so as to relieve the weariness of waiting. You need not interfere at this period with her ordinary diet, but she is better without stimulants, and you should make sure that the bowels are freed, if necessary, by a dose of castor oil or an injection. Quiet and cheerful conversation, a cool room, mild diet, slight occupation, and a hopeful view of the case, will be all that is necessary until the second stage sets in. She should never be encouraged to bear down, or "assist herself," as it is termed, until the second stage begins, and the pains force her to do so; nor is her crying aloud objectionable, unless it be excessive, and she lose all control of herself.

Preparation of the Bed.—When the waters break, unless this occur prematurely, the patient should, generally, go to bed at once; but, previously, the bed must be *made* so as to protect it from moisture, and to admit of the soiled linen being removed at once, and without disturbing the patient, and this is the way you should do it:—Under or over the lower sheet (for it does not signify which), you should have placed a tanned sheepskin, or a yard and a half square of oiled silk, or water-proof cloth, at the right side of the bed, where the hips are to be, and hanging a little over the side; upon this, the end of a sheet folded twice lengthwise, and upon this again, a sheet folded four times square, so that, after a labor is over, this upper sheet can be easily removed, and if the under one be soiled, it can be drawn out so as to bring a dry part under the patient, whilst the soiled portion is rolled up and pinned. When the discharge has moderated, say in six or eight hours, this sheet and the leather may be removed, and the under sheet and bedding will be found perfectly dry, and may easily be kept so by the free use of napkins.

When the patient is placed on the bed thus made, with her hips close to its edge, the under portion of her night dress should be turned up above the hips, and a folded napkin or two so placed as to secure that the waters or discharges do not flood the bed, and make the patient uncomfortable, or render a change of dress necessary. Thus arranged, you will find the patient not only protected from discomfort at the time, but afterwards she can be made quite comfortable, without fatigue, exposure, or exertion.

POSITION AND DUTIES OF NURSE DURING LABOR. — During the second stage of labor your place is on the side of the bed opposite to the physician. You can give the patient your hand to pull until the head is born, when it is your duty to make steady and firm pressure upon the uterus as it contracts and descends; and this you should do, not by pressing it directly towards the spine, but by enclosing the fundus of the womb in your right hand, and pressing it downwards towards the pelvis. Then you will follow down the uterus until the child is born, and you will keep up this pressure until the binder is applied, and afterwards you can resume it if the doctor wish. You should always have a vessel ready to receive the afterbirth. The most convenient thing for this purpose is a small basin.

During the labor, but especially during the second stage, the patient suffers more or less from thirst, and the most suitable drink will be whey, milk and water, or weak tea, or a moderate quantity of cold water. From a mistaken notion of keeping up the strength, wine and water is sometimes given; but I believe this to be unnecessary, and I think it will rather be found to increase the heat, and sometimes to interfere with the labor pains. During the early part of the labor, the patient should be allowed, or rather encouraged, to take her usual meals; as the pains increase, she will lose all inclination for eating, but it is of consequence that she should take something occasionally, if the labor be prolonged, in order to give the stomach something to do, otherwise, she will, probably, suffer from flatulence. It is, especially, the nurse's province, as I have already remarked, to see that attention be paid to the natural evacuations; that the bowels are freed during the early part of the labor, and that throughout, afterwards, the urine is discharged. Neglect of this latter precaution may lead to very unpleasant consequences.

She should keep the room quiet and cool, and give the patient some cool drink occasionally, a little thin gruel, milk and water, whey, or weak tea, whichever she prefer; see that the bladder is emptied at intervals; should not mistake the escape of "the waters" for this; and if the bowels have not been moved previously, she should give an injection of warm water or thin gruel. She will encourage the patient more to bear her labor courageously, by a frank, simple statement that all is right and going on favorably, than by fallacious promises of speedy delivery, which the nurse knows, and the patient will soon find out, not to be true.

As the pains increase in strength, they compel the patient to "bear down," and generally she does not need to be told to do this, for she cannot help it; but it will be well to direct her only to do this so long as the pain is severe; as it declines, it will be of no use, and only occasion fatigue. It is usual to fasten a sheet round the bedpost for the patient to pull, and sometimes to place a box at her feet for her to push against. The latter is objectionable on many accounts: it tends to disturb the position of the hips, which should be maintained, and it may remove the perineum from the hand of the obstetrician at the moment when support is most essential; and I think that the voluntary rigidity of the thighs and hips, thus occasioned, rather hinders the escape of the child's head. There is no objection to the sheet, if care is taken that the patient do not draw herself beyond the protected portion of the bed. I think, however, that the hand of a person sitting opposite to her is still better, as she can pull as much as she wishes without changing her position. Unless under peculiar circumstances, it is wrong to have any one sitting on the bed, or leaning over the patient, as it adds much to her heat and discomfort. As the labor advances, the patient becomes very hot, and some of the upper bed-clothes may be removed for a time.

THE BINDER.—When labor is found to be progressing regularly, the nurse should see that half a dozen strong pins, a pair of scissors, some ligatures of threads or tape or twine, and the binder, are in readiness. The latter should, generally, be about half a yard wide, and from a yard and a half to two yards long; but it is best to make the binder according to measure, taking for its length what will go round the woman's hips, with two or three fingers breadth additional, to allow for overlapping; and for its breadth, taking from just beneath the breast to the level of the hip joint. It is usual to make the binder of strong diaper or twilled calico, doubled and stitched at the edges. If the lady is to be confined in the winter, a very good binder may be made of thin "lining flannel," and one fold of diaper or twilled calico. A strip of calico stitched to the binder behind and passed between the legs, below a napkin, and then pinned in front, is useful in keeping the binder straight. Of whatever material it is made, it should be well washed and dried before it is required for use. There are other binders ingeniously contrived with buckles and straps, and cut to fit the shape, but I have not found them as easily put on or removed, nor do I think that they make as firm pressure as the simple binder above described.

DUTIES OF NURSE AFTER THE BIRTH OF THE CHILD.—When the child is born, and the placenta expelled, the nurse should remove the soiled linen from the patient, and apply warm napkins, so as to make her comfortable for the time, without exposure or exertion on her part; and having replaced the bed clothes, which were lightened during the heat of the second stage, the nurse is at liberty to turn her attention to the infant.

APPLICATION OF BINDER.—The first thing to be done after the birth of the child is to apply the binder. To do this properly, the nurse should roll up about the half of it, and pass it underneath the patient to an assistant, who will unroll it, and pass over the end of it to you. Take care that it is fairly and smoothly under the hips; then, drawing it tight over the lower part of the abdomen and hips, pin it there first; and drawing it equally and firmly over the upper portion, fasten it by two or three other pins, so that a pleasant and comfortable, yet firm, pressure may be made.

I may as well mention here the mode of making additional pressure, by pads or compresses. If this should be necessary, fold a napkin *in a roll* first, and place that across the abdomen, *above the uterus;* then fold as many more as may be necessary, *in squares*, and place them *over the uterus:* the former will prevent the womb from ascending in the abdomen, and the latter, from enlarging anteriorly. The binder is then to be drawn tightly over the whole. You will find that in this way you can make any amount of pressure you please. There is one point I wish to impress upon you very strongly, and that is, that this, and almost every other operation with which you are concerned, may, and ought to be done, with little or no exposure, or uncovering of the patient. The neglect of this precaution is not only an offence against delicacy, but it causes the patient to run great risk of catching cold, and cold in childbirth is a very serious thing, indeed.

SUBSEQUENT TREATMENT.—When the doctor leaves the house, the nurse's first duty is to see that his directions are implicitly obeyed. Remembering all the patient has gone through, it is evident to common sense, that the quieter she is kept the better: not more than one or two persons should be allowed to enter the room, and no running in and out should be permitted. There should be very little conversation, and that neither in a loud tone, nor in whispers, for the latter tease the patient by exciting but not gratifying her curiosity, and the former will give a headache. The room should be shaded, but not kept too dark, the temperature should be carefully regulated, and sufficient ventilation secured.

There are two questions the patient is almost sure to ask, and which you should be prepared to answer: *first*, whether she may change her position, by turning on her back, or on the other side? There can be no objection to this in ordinary cases; but if there be any disposition to flooding she had better remain as she is, that being the most convenient position; or if she be in a great mess from discharges, she had better wait until this is removed and she is made more comfortable.

The *second* question is, whether she may go to sleep? Against this there is a prejudice amongst nurses, I believe, because in flooding cases the patient feels sleepy, and if allowed to sleep without being disturbed by examinations, and the flooding continue, she may faint without its being discovered, and perhaps die without assistance. But if the nurse watch over the uterus and the discharge, so as to ascertain, from time to time, that there is no flooding, there is no reason why the patient should not sleep, and certainly there is nothing which will refresh her so much.

Having now mentioned what you are to do, let me conclude by a few cautions as to what you are *not to do.*

1. You are not to amuse your patients by accounts of the wonderful and dangerous cases you have attended, even though the relation may be to your own credit.
2. You are not to relate anything which may tend to depress your patient, or render her anxious and uneasy.
3. You are not to tell lies, or make promises, as to her labor being soon over, even for the purpose of cheering her; as she will surely find you out, and will not afterwards believe you, even when you tell the truth.
4. You are not to put her to bed during the first stage, nor encourage her to make bearing down efforts at an early period, because they will do no good and will fatigue her.
5. You are not to give hot or stimulating diet or drinks, under the belief that they will quicken the labor.
6. You are not to allow too many visitors in the room — one or two are quite enough: hot rooms, hot drinks, many visiters, and useless efforts are most pernicious, and may easily convert a natural labor into a tedious one, if not something worse.
7. You are not to keep the patient too hot during the second stage.
8. You are not to mistake the dribbling of "the waters" for passing urine, but make sure that the bladder is emptied at intervals.
9. You are to apply the binder, remove the soiled linen, and make the patient comfortable, without exposing her to cold.

CARE OF THE NEW BORN INFANT. — When the child has been separated from the mother, it is usually rolled in flannel, and placed at the foot of the bed, or on a sofa, where it exercises its lungs by crying freely; nor is this injurious, for it is not by the first efforts, nor by gentle efforts, that respiration is fully established. Before laying it down, however, the nurse should gently and carefully wipe the eyelids, to remove any discharge which may prove irritating, and see that there is no bleeding from the cord.

WASHING THE INFANT.—As soon as the nurse is at liberty, her attention is required by the child, and the first procedure is washing. This should be done in warm water—soap is not necessary—in a gentle and handy manner. It is not advisable to be so particular as to make the process very long, for the second washing will be far more effectual. The cheesy matter with which the child may be covered, will readily wash off if it be first smeared with butter, lard, or sweet oil, but if not entirely removed by the first washing, it will be found dry and falling off in flakes or dust, the next time the child is undressed. It is a very common practice to apply whiskey or brandy to the infant's head, but this appears a very useless custom, and one which may lead to mischief, if a drop of the fluid should splash into the eye.

DRESSING THE INFANT. — When the washing is finished, the child should be gently and thoroughly dried with warm, soft napkins, before the fire, and all its clothes having been warmed it should be dressed as speedily as possible, and made warm and comfortable. Do not forget, before you put on the flannel binder, to make sure that there is no bleeding from the navel-string. A little soft rag should be folded around the remains of the funis, and turned up upon the belly; over this the flannel binder is placed. All the articles of dress that come in contact with the skin should be soft, and all handling performed gently, as is obviously necessary, if you consider the extremely delicate state of a new born infant. Strings should be substituted for pins, wherever it is possible, and all complicated contrivances avoided; it is desirable a baby should be dressed, or undressed, as easily as possible. You must be very cautious with the few pins which are deemed necessary, not to allow the points to come in contact with the child; and with the strings and bandages, that they be not too tight. You will be expected, no doubt, to give an opinion upon the important subject of caps, and will, naturally, ask me for mine. Doubtless, "much may be said on both sides," but I confess that I can see no advantage in dispensing with them, but a saving of expense. It is not more *natural* to have the head uncovered, than it would be to have the legs so; I am sure that the absence of caps never prevented "water in the head," and certainly the infant has one more chance of taking cold, to say nothing of their looking very ugly, without caps. However, I generally let my patients take their own way, as I know that they will do as they like, whatever I may think; this *only* I stipulate, that the head shall, at all events, be lightly covered with a flannel shawl for a week.

Now, remember, that as regards dress, the infant requires softness, looseness, and warmth; and as regards handling, gentleness and dexterity.

PHYSIC FOR THE INFANT. — After washing and dressing, comes the question of physic and food. No doubt, if the mother have plenty of milk, it will act as a purgative, and render medicine unnecessary; perhaps, even without it, the child's bowels might be moved spontaneously: nevertheless, as few women have milk the first day, and as the retention of the meconium is apt to gripe the child, and make it uneasy, it is generally advisable to give a small teaspoonful of castor oil: at any rate, if the bowels are not moved in the course of twelve hours. Sugar and water, or butter and sugar, are sometimes given to the new born infants, but if any purgative be required, castor oil is far better than such mixtures.

FOOD OF INFANT. — By far the best food for an infant until its mother can supply its wants, or to make up for her shortcomings for a week or two, is equal parts of cow's milk and water, sweetened; or three parts of ass's milk, and one part of water. But how often should an infant be fed? Whenever it is hungry, of course; but not, necessarily, whenever you think it hungry, because it cries. A new born baby will, probably, require something about every two hours, and surprising as it may seem, it is quite possible, at this early period, to lay the foundation of orderly habits, and quite impossible to overrate their value. Give the baby its food every two hours, or thereabouts, unless it be asleep: either its natural food, or milk and water, with a spoon, or from a cup or feeding bottle; the latter is the best, provided you wash it each time after using it, and remove and cleanse the teat on the nipple. A little experience will show you the proper quantity to give each time; and, fortunately, any little excess is remedied by the stomach rejecting the surplus. When "possitting," as it is called, occurs, or if the stomach be unusually delicate, it is better to give the child less at a time, and rather oftener. If the mother have not milk enough, or if full nursing be too much for her strength, you must supply her deficiency by feeding; and I think it will be better to feed the baby at night, so that she may get a good sleep, and let her nurse it during the day; after a time, when she is quite strong, she may reverse this, and feed the child during the day, if she cannot nurse it altogether, as the most natural, and most convenient, and most comfortable sleeping place for the baby at night is in its mother's arms, at least for some time. As the child grows older, a change of food will be required, for the same food, if continued long, almost always disagrees with the child. During the first month, and I am only at present concerned with this period, the changes need be very few; but for infants somewhat older, I may mention, as varieties in addition to milk — barley-water, prepared barley or groats, arrowroot, panada, rusks, and bread jelly. The latter is made by pouring boiling water on the crumb of bread and squeezing it out again four or five times, and then simmering it gently with a little water in a saucepan until it is thick enough to set, which it will do on cooling. A spoonful of this jelly, with water or milk, and sugar, makes a very nice food. Whatever food you give, take care that it is very thin. No doubt a child is "more satisfied" by thick food, just as you are after a heavy meal, but it is not the more healthy way of feeding for either.

Subsequent Treatment of Infant. — Having said so much about food, we must retrace our steps a little. Very little physic will be necessary after the first dose; and the less the better. Until the dark green stools (meconium) have passed off, and the discharges become yellow, the child is apt to be griped and uneasy, but this will only last a day or two; the mother's milk will then be coming, and that, at first, acts as a gentle purgative, so that the bowels will generally be moved three or four times a-day, which will be sufficient. You are not to think it your duty, however, to give the child medicine if it do not come up to this standard; nor are you to remedy too great frequency by a dose of castor oil: in such a case you should ask the medical attendant for a prescription. Remember, that to a young infant a purging is much more serious than a slight costiveness. In addition to castor oil, the only medicine of which a nurse should have command (unless ordered by the doctor) is fennel water, which may be given mixed with water, or with the food, if the child suffer from flatulence; and these medicines should be kept apart from all others. Avoid all quack medicine, and all tampering with stronger medicines than those I have mentioned, or you may incur a life-long reproach. I knew a nurse who, either from carelessness, or a wish to relieve the child, gave it a small dose of laudanum, and it was with difficulty saved from death. No doubt, young infants suffer from flatulent pains, and make their sorrows heard, but you are not at once to conclude that they need physic; a little fennel water, warming the feet, a warm flannel to the stomach, or a warm bath, will almost always afford relief. When a child cries violently, without apparent reason, it is not a bad plan to see if the point of a pin be not the cause. And if simple means do not afford relief in a reasonable time, you ought to send for the medical attendant without delay; you may lose valuable time, and what will affect you sensibly, credit, by trying to cure the case yourself, when it is beyond a nurse's skill.

Sleep of Infant.—Next, and nearly equal in importance to the infant's food, is its sleep. Without sleep an infant cannot thrive; and a nurse should make it a rule never to disturb an infant, not even to show it to the dearest friends. You can easily give it a habit of sleeping at an early age, and hunger will generally wake it: the more it sleeps the better. When convenient, after the first few days, the best place for it to sleep is the mother's bed, as it will be sure to be warm there; but if you lay it down in a cot you should ascertain that its feet are warm, and that it is warmly covered, and secured against draughts. As it gets older, it will remain longer awake, of course, but you should, as far as possible, keep to regular times for sleep, and the midday sleep should be continued until it is three or four years old.

Cleanliness of Infant.—Another matter of great importance to an infant is cleanliness. I do not mean that "rough and tumble" cleanliness which consists in putting on a clean frock over soiled petticoats, or a clean pinafore over a dirty frock; but that minute cleanliness of a child's person, and of its inner as well as its outer garments, which ought to be the aim of all good nurses. An infant should be washed most carefully, after being fed, every morning, and in a slighter degree in the evening, and its dress entirely changed each time. The water should be pleasantly warm, and soap will rarely be necessary. A soft fine sponge or flannel should be used, and the operation performed with gentleness and quickness. Take care that all the creases and folds of the skin are cleansed, and every part of the body which comes in contact with another part, as neglect here will surely lead to scalding and chafing. After this it must be thoroughly dried with a warm soft napkin, and all the creases well powdered. For this purpose, fine starch or hair powder is generally used; they answer the purpose very well generally, but there is a much better powder, called "Lycopodium," or puff-ball powder, which may be obtained from the chemists. If a part be dusted with this powder, water will pass over it without dissolving it, or washing it off, or wetting the skin. I have found this most useful with soft children, who are scalded, but especially when the buttocks or groins are affected.

Washing and dressing are distressing enough; and when all is finished, the child is generally ready for a sleep, in which it should always be indulged. A very careful watch should be kept upon the natural evacuations, so as not to allow them to remain in contact with the child longer than you can help: half the cases of chafing and scalding we meet, arise from the nurse's neglect in this particular, although they are ingenious enough in finding out other causes. No napkin that has been soiled by the bowels should ever be applied again until it has been washed; and at first, or with children of tender skins, no napkin that has ever been wet should be used more than once. More than twice they should never be used, even with older children, and before applying them, you should see that they are thoroughly dry, and soft, and warm. After each movement of the bowels, the infant should be sponged, dried, and dusted, and the latter always after passing water. In these operations also, it is curious how early regular habits may be acquired; after a month or two, a baby will quite understand what it is "held out" for; and such habits promote health as well as cleanliness.

Chafing and its Treatment.—But suppose, in spite of all your care, a child should chafe, and become sore: you must bathe the parts very gently with milk and water, and dry them carefully, two or three times a-day, and dust them with the lycopodium powder; if they do not improve, you may try a lotion of the sugar of lead (20 grains to an ounce of water), or of the sulphate of zinc (white vitriol), four grains to an ounce of distilled water; applying either, after washing or drying the part. If you employ the sugar of lead lotion, remember that it is poisonous, and be careful where it is kept, and also that it is properly labelled for fear of mistakes. If, under this treatment, it do not heal in a few days, the family doctor ought to be consulted.

Convalescence after Delivery.—Let us now return to the patient, whom we left settled after delivery, and allowed to sleep; and trace the progress of her recovery, and the symptoms which characterize her convalescence. I shall treat the subject under different heads, and describe the symptoms as they occur naturally, or as they deviate from their natural and healthy condition; and under each head I shall speak of your duties.

1. A very slight observation will show you that the condition of the patient is much changed after labor. She is much more exhausted than you would expect, from the exertion she has made; she is pale, wearied, and, as you say, "worn out;" yet, on the other hand, her senses are too acute, and she is painfully affected by light and noise, which she would not have minded previously. Her appetite is gone, and the various secretions are a good deal altered.

Nervous Shock.—This all arises from the shock to the nervous system, and is independent of both the exertion and the amount of blood lost.

Nay, this shock is sometimes so severe, especially after an operation, as to protract the recovery for many weeks, or even, in rare cases, to prove fatal.

In ordinary cases no medical treatment is required on account of this state of things; but you must be careful to allow the patient to rest until she recovers from it. Keep the room quiet, cool, and shaded; forbid visitors, and allow no whispering, and little talking, and every day will show an improvement.

Even more care, caution, and stillness will be necessary after operations, or when the shock is more severe than usual, and will have to be continued longer. You will also have to carry out the directions of the medical attendant as to medicine and diet, and this you must always do with scrupulous punctuality. When directions have once been given, you are not at liberty to deviate from them, either to gratify the patient or her friends, or in accordance with any notion of your own.

2. The respiration and circulation remain somewhat hurried after delivery, but by degrees this hurry subsides; and when this is the case, your only duty, in reference to it, will be to keep the patient cool, comfortable, and tranquil. Should either the breathing or circulation become quicker or labored, you must instantly inform the medical attendant.

3. Immediately after the expulsion of the placenta, I have told you that the *uterus contracts*, and if all goes on well, this contraction continues permanent, but increased now and then by afterpains. It may be felt as a hard tumor in the lower part of the abdomen, about the size of an infant's head, and each day it diminishes, until at length it sinks into the pelvis, and cannot be felt.

The vagina has been, of course, very much stretched by the passage of the child, but it is so elastic that it speedily recovers its natural state. The inner edge of the perineum is often slightly torn in first labors; but if it be not more than this, you will hardly be able to discover it the next day, and it is of no consequence.

Every day, and more than once each day, for the first few days, you will make a point of ascertaining that the uterus is properly contracted; for as long as it is so, there is little fear of flooding. But it may be larger than it ought to be from various causes; and if you find it so, especially if it be tender on pressure, you must mention it to the doctor, and ask directions from him.

A fresh binder should be applied every morning, and tightened so as to afford firm support without being painful: it becomes displaced very soon, however, and will require rearrangement three or four times a-day. You should always pay special attention to this matter, as it is a great vexation for a lady to find her figure spoiled when she is able to dress and go down stairs. The abdomen is so loose for some time, that, unless artificial pressure be made, it is almost sure to distend from flatulence, and once distended, you will find it almost impossible to remedy it until the next confinement.

The external parts should be carefully washed with warm water ten or twelve hours after confinement, and this should be repeated daily with every precaution against cold. A soiled sheet folded should be placed under the hips, and the patient be kept covered. If you discover more than the slight laceration I have mentioned, or if there be any unusual inflammation or soreness about the vulva, you should call the attention of the doctor to it on his next visit.

4. After-Pains.—Connected with the condition of the womb are the *afterpains* which result from its contractions. You rarely observe them after the first confinement, and as rarely are they absent after subsequent ones. They commence generally in the course of an hour or two after delivery, last for a minute or two, and then subside, to be renewed at intervals. During, or immediately after each, there is often a slight increase of the discharge, or some clots expelled, although the pains are themselves a security against flooding. They continue for two or three days, increased for a time by suckling, but gradually becoming less frequent and less severe until they disappear.

This is the ordinary form of afterpains, and so far from regretting their occurrence, medical men consider them as beneficial when not too severe. In some instances, however, this is the case; they are as painful as labor pains, coming on very frequently, lasting some time, and depriving the patient of rest. Or, after apparently subsiding, they may recur on the third or fourth day, and at the same time you may observe the uterus larger than it ought to be: after a time you will generally find a clot expelled, and then the afterpains cease.

Little treatment is required if the afterpains are natural and not excessive; a warm napkin, or piece of flannel over the uterus, will afford temporary relief. In the more severe cases, you had better obtain a prescription from the medical attendant; or, if you are acting alone as midwife, you may give a draught containing from twenty to twenty-five drops of laudanum.

5. The Lochia.—The discharge of blood which occurs after delivery, diminishes in quantity, but continues for some time: this is called "*the lochia*," or "lochial discharge," or "cleansings." At first, it is red like blood, but after a few days it gradually becomes paler, then yellowish or greenish, and is called by nurses the "green waters." Occasionally the blood coagulates in the vagina, and forms a large clot, which may require pains to expel it, or it may even render passing water difficult. When expelled, it occasions the patient some alarm and uneasiness; but this you may relieve, as it is of no consequence, and merely indicates that the discharge has been more than usual. The quantity varies very much, and so does the duration of the discharge; sometimes it is very scanty, especially when the child dies before birth; and sometimes it ceases in a fortnight, especially when there is an abundant secretion of milk. It ought to be over in about a month at all events.

On the other hand, there may be too much at first; or it may come on more flush some days after delivery, or on sitting up; or it may return after having changed its character; and in all these variations there may be nothing seriously astray; but it will only be right that you should acquaint the doctor with the occurrence, that he may decide whether any treatment be necessary.

It will be your especial care that neither by cold nor exposure shall the discharge be checked. Napkins, well dried and warm, should be constantly applied, and changed often enough to prevent their becoming wet applications; and the binder should be kept tight so long as the discharge is excessive. Nor should the patient be allowed to make any exertion until the quantity has moderated and the color changed, or else it may so increase as to amount to flooding.

6. STATE OF BOWELS AND BLADDER.—Owing partly to the quiet lying in bed, and partly to the relaxed state of the abdomen, the bowels are seldom moved after delivery until medicine is given; and the patient will sometimes allow the urine to accumulate in the bladder. Occasionally, indeed, when the second stage of labor has been tedious and difficult, the patient is not able to pass water at all for some days subsequently.

Now it is very desirable that the urine should be passed at moderate intervals, and you should induce her to try and do so some time, say six or eight hours, after delivery. The application of a warm cloth to the vulva will facilitate this, and, applied afterwards, it will remove any smarting. If the patient turn on her face and knees, she will sometimes succeed in voiding urine, when she cannot do so in any other position. If after one or two moderate efforts (and you must never allow much forcing) she is unsuccessful, you must obtain assistance and have the water drawn off.

However desirable it may be that the bowels should be moved, I do not think it wise to effect this by medicine for twenty-four or thirty-six hours after delivery. This rest will allow the patient to recover a little, and the organs to return more or less to their natural state; nor have I ever known any mischief to arise from waiting so long. After this time, if they are not moved naturally, a dose of castor oil, Gregory's powder, or the common "black bottle" (senna, salts and ginger), moderate in amount, may be given very early in the morning. As a general rule, I think that pills do not act satisfactorily when the patient is confined to bed. If the first dose of medicine produce no effect, it may be repeated, or, what is perhaps better, an enema of a pint of warm water, or thin gruel, with a tablespoonful of castor-oil, or table-salt may be given. In administering this, you will have to be very gentle: remember that all the parts are very tender: direct the point of the pipe back towards the spine, use very little force, and stop and change the direction if the patient complain of pain. Should she suffer from piles, you had better not try the enema. And when the medicine operates, or the patient passes water, do not let her sit up: she must use the bed-pan, and, at the most, have her shoulders slightly raised. To prevent the patient receiving any cold impression from the pan, it should be warmed at the fire before using it, or, what is better, should be cased in flannel.

PILES.—As I have referred to piles, I may as well say a word or two about them. They are very common during pregnancy; and in some cases where they did not exist during pregnancy, they come on after delivery, and add much to the patient's sufferings. Sometimes they grow from the orifice of the anus, and are called external piles; in other cases they form within the bowel, and are forced down when the bowels are moved, and remain outside: these are the most painful, as, when down, they are grasped by the anus (or orifice of the bowel) and strangulated. Now when your patient complains of piles it is your duty by an examination, to ascertain whether they are external or internal; if the latter they must be returned within the bowel, which you can do by oiling the points of your fingers, and pressing the piles gently, yet firmly, upwards, until they pass into the bowel; and this you must repeat whenever they come down. If they be external and very tender, you should foment them twice a-day, and apply a nice soft poultice of linseed-meal afterwards: if this afford but little relief, two or three leeches may be applied to them. When the tenderness has diminished, a little ointment of galls, smeared over them two or three times a-day, will generally reduce their size, and hasten their disappearance.

7. CONDITION OF BREASTS.—During the latter part of pregnancy, as you know, the breasts are enlarged, and even before labor often secrete a thin kind of milk; but you do not generally find true milk formed until after labor. About the end of the second, or during the third day (sometimes earlier), the breasts enlarge and become hard, and, if not relieved, very painful, particularly in first confinements.

This change may be preceded by a rigor, or fit of shivering, and accompanied by a degree of fever, with quick pulse, hot skin, headache, and thirst: these symptoms need not alarm you, if you are satisfied that they arise from the milk. Let me remark here, that the occurrence of a rigor in childbed is a circumstance that always demands particular attention, as it is often the first symptom of inflammation of the womb, or of some form of that most dangerous complaint, puerperal fever. If it be caused by the coming of the milk, it need occasion no alarm, but ascertain positively, and without delay, that this is really the cause of the rigor. You may come to this conclusion if you find that the breasts are becoming kind and tender—if the lochia continue in proper quantity, and if there be no pain or tenderness of the uterus. Whenever you are in doubt whether this shivering be dependent or not upon the state of the breasts, your safest plan is to call in the assistance of the accoucheur, for the loss of a very few hours in puerperal fever may place the woman beyond the power of medicine. Whenever your patient takes a shivering, therefore, no matter from what cause, attend to her instantly, as it is most desirable to check it. Put a hot jar or hot blanket to her feet; lay an additional blanket over her shoulders, and give her a warm drink of whey, tea, milk and water, or oatmeal tea. To this drink, a few grains (8 or 10) of nitre, or half a teaspoonful of sweet spirits of nitre, or a dessert spoonful of mindereru's spirit may be added, if at hand.

The true remedy for the enlargement of the breasts is, of course, the application of the child; but in some cases the increase is so rapid, that the child can make no impression, especially with first children, or if the nipples be defective; and the breasts go on increasing, until, by the excessive distension, inflammation is excited, and an abscess, or "bieling" of the breast, may be the result. In other cases, when the infant is put too often to the breast before the milk is come, or where the skin of the nipples is very tender, it becomes irritated and inflamed, and either cracks or ulcerates, giving rise to great suffering and disappointment. Nay more, unless you are very careful, and even sometimes, in spite of all your care, the inflammation may extend from the nipple into the gland of the breast, and an abscess form. I believe this, and cold from exposure, to be the two most frequent causes of this painful and troublesome affection.

PUTTING THE CHILD TO THE BREAST.—How soon after delivery ought the child to be put to the breast? If the patient have had children before, and the breasts contain milk, I should say the sooner the better, after she is rested from the fatigue of labor, say in six or eight hours. If it be her first child, and the breasts be enlarged, I generally have the child applied once within twenty-four hours, and twice or thrice the next day, if it get any milk; but not more, lest the nipples should be irritated. But if the breasts are flaccid and flat, you had better wait until the second or third day. If the draught be free, the child strong, and you are able to apply it early enough, and sufficiently frequently, you will almost certainly avoid milk fever, and the excessive and painful enlargement of the breasts; but the condition of the nipple may, possibly, interfere with the frequent application of the child. As the breasts increase, the child may make more ample use of them during the day time, until on the fourth or fifth day its entire nourishment is derived from the mother.

If, however, the breasts become hard and knotty and painful, in spite of the efforts of the child, you may afford great relief, and facilitate the flow of milk, by rubbing them gently with a little warm oil—rubbing them *gently*, I say, not as if you were polishing a mahogany table. In performing this simple operation, the patient should lie on her back, and rather toward the side opposite to the breast that is to be rubbed, and you should make the friction with your hand around the base of the breast first, and gradually approach the nipple. Do not move your hand in a direction from the nipple towards the base of the gland, but just the reverse. A small bit of camphor dissolved in the oil is a pleasant addition.

In this state of the breasts, a "cire cloth" is often applied to them, and with much benefit. This is nothing more than a piece of soft old linen, the size of the breast, and having a hole cut in the centre for the nipple. On one side it is spread with olive oil and bee's wax melted together, and this side is applied to the breast. Although rather a dirty application, it is often found to be productive of ease to the patient, and may be kept on for two or three days.

But I should wish here to point out to you a distinction too often forgotten. When the breasts are enlarged and knotty from over distension, rubbing affords great relief; but if they are running on into inflammation, rubbing will make them worse, and destroy the only chance of escape from an abscess. I have seen this mistake and its results over and over again. The chief distinction for your guidance is, that in over distension the hardness is equal over the whole breast, there is little or no tenderness, and the skin is pale; whereas in inflammation, one part of the breast is particularly tender, and there is a peculiar hardness there; the breast is very painful when moved, and there is a blush on the skin of some portion of it. In these latter cases the soothing treatment—fomentations, poultices, etc.,—is the only one likely to be successful.

Attention to the Nipples.—As regards the nipples, I have already mentioned that the skin should be hardened during the latter months of pregnancy, by the application of spirits and water, after washing with soap and water, and drying. It is a good plan to sponge the nipples with cold water each time after suckling, and then to apply brandy and water. If you find the nipples becoming tender and raw, or cracked and painful, great relief may be obtained by the application of a small soft poultice, for a short time after suckling, and then from the use of a lotion of alum and water, or equal parts of tincture of catechu and water, or strong green tea. In some cases, it is advisable to apply a weak solution of lunar caustic, but this you had better leave to the doctor.

Inflammation and Abscess of the Breasts.—If, notwithstanding the early and careful application of the child, and attention to the nipples, the breasts should inflame, either from cold, over secretion, or extension of inflammation from the sore nipple, what are you to do? Not to rub them, but to foment and poultice them until you can get advice; but if you should not be able to obtain this, six or eight leeches may be applied, followed by constant poulticing, until either the inflammation subsides, or suppuration takes place, supporting the breast by a sling, so that it cannot hang down; taking care, at the same time, to keep the bowels free. During this process, it is better to confine the patient to a simple, moderate diet; allowing broths if there be not much fever, but no wine until the abscess is evacuated; and remember that it is better to have the abscess opened than to let it break; it will be more completely emptied, will heal sooner, and it may happen, that by avoiding the neighborhood of the nipple, the future use of the breast may be secured.

Care of Breasts in such as do not Suckle. — But suppose the infant to be dead, or the patient unable or determined not to suckle her child, what are you to do? You cannot prevent the secretion of milk, and I do not think that the methods of checking secretion, by cold applications, etc., are safe or advisable. But if you remember that the amount of milk secreted depends partly upon the food taken into the system, and partly upon the amount of milk drawn from the breasts, you will see that you have a safer, though slower, method of putting an end to it. Diminish the diet, especially the fluid portion of it, and take away a little milk occasionally, by the child or by a breast-pump, just enough to relieve the sense of distention, and you will soon find that less is secreted, and if you gradually diminish the amount you take away, in the course of a week or two, the patient will not require this assistance. And, at the same time, you may have recourse to gentle frictions, fomentations, and the cire cloth.

Incontinence of Milk. — When the milk runs freely on the application of the child, scarcely any assistance or interference on your part will be necessary; but, on the other hand, I have met with a few instances in which the milk all ran away, so that with an ample supply the child was nearly starved. In one case, both breasts kept continually leaking without cause; in other cases, when the rush or draught was excited in one breast, from the application of the child or any other cause, it not only was felt as usual in the other, but the milk ran from it as freely as it was drawn from the one in use. This may be called "incontinence of milk," and seems to depend upon some local weakness. In such cases, I think that astringents applied to the nipple, and the use of nipple glasses, are of the greatest benefit.

Changes in the Milk. — At a more advanced period of nursing, when the mother is exposed to various external influences, you will find the milk liable to be affected both as to quantity and quality. Thus the exciting or depressing passions will equally affect the quantity of milk; but they may do more, they may change its quality, and so injure the child seriously. I know an instance of this in two ladies who, when nursing, were plunged in grief by the death of a third sister, and both lost their children shortly after. Great grief is, therefore, a strong argument for weaning the child, or for substituting feeding for nursing, for a time. But those emotions which merely check the secretion, are of less consequence; and, in general, when they cease, the milk returns. I need hardly tell you, that the "milk powders," sometimes given to increase the milk, are a delusion, except so far as they act upon the imagination of the patient and relieve her fears.

Summary of chief points in respect to Management of Convalescence after Delivery. — I have now gone over the chief peculiarities of childbed, their variations, and the management necessary: there remain still a few points of management, upon which it is desirable that I should say a few words.

1. **Cleanliness.** — You cannot be impressed too deeply with the necessity of cleanliness and tidiness, not only personal, but general, as regards the sick room. The patient should be carefully washed, her hair settled, and her night dress and cap, after the second day, changed morning and evening, the napkins changed twice a-day or oftener, and the parts carefully washed with warm water, and dried once a-day. The bed-clothes should be straightened when tossed, the room dusted and made orderly every morning, all unnecessary matters removed, and everything kept in its proper place. Trifling as such things may seem, they exert a positive influence upon the patient, and may thus favor or hinder her convalescence.

2. **Diet.** — The diet of the patient is of great importance, though I am not disposed to attribute to it as great an influence as some have done, nor

have I seen as much mischief arise from deviations from the ordinary rules as from other causes; still it is evident that errors in diet, whether as to quantity or quality, ought to be sedulously avoided. In general, the patient should be kept on bland, sloppy diet for five or six days; perhaps your best guide will be the state of the milk: when the secretion has been reduced to the ordinary quantity required by the child, or in other word, when the child is able to take all its mother has for it, the diet may be safely increased, if in other respects she is going on well. Whey, milk and water, or weak tea for ordinary drink; gruel, panada, sago, tapioca, or bread and milk for lunch and dinner; with tea, not too strong, in the evening, will afford sufficient variety; bread and butter, of course, she may have. When the first rush of milk has subsided, about the fifth or sixth day, chicken broth, with or without bread or toast, as she pleases, or beef tea, may be allowed for dinner; then chicken panada, chicken roast or boiled, a chop, etc., with a glass of wine, until she gradually resumes her ordinary diet. I think wine agrees best with the patient for the first few days, but afterwards she may have malt liquor if she prefer it.

3. Rest.—Of even greater importance than the diet, is the keeping the patient in bed sufficiently long, and for some days in the supine position; almost all the more serious attacks of illness I have seen, have resulted from sitting up or getting up too soon. The labor first, and then the lying in bed, render the system so sensitive, that a very slight exposure is sufficient to give cold. For three or four days the patient should absolutely be confined to the horizontal position, and not be allowed to sit up in bed. Cases of sudden death have repeatedly occurred from patients sitting up too soon after delivery. Then she may be propped up with pillows or a bed-chair during meals, and occasionally through the day, avoiding fatigue, and not even permitting this liberty if there have been flooding.

I turn a deaf ear to all requests to leave her bed, even to have it made, before the eighth day, and I have found the benefit of so doing. The bed can be shaken up very effectually, if the patient be placed near one edge, and then near the other, while the bed is making; and this prolonged rest allows the organs which have been so much disturbed, to return gradually to their natural condition, and by the eighth day the general sensibility is so much diminished that the patient is less susceptible of cold. On the eighth day, then, she may sit up for an hour, not dressed, for that would fatigue her too much, but warmly wrapped up in petticoats, shawls, and dressing gown. The next day she may sit up longer, and be more fully dressed, and afterwards she will gradually resume her usual habits in this respect.

4. Occupation.—Another point of minor importance, but bearing upon the patient's comfort, is her occupation during the period of confinement after labor. Of course, for two or three days she is too weak to think about anything but her safety and her child, and too much occupied with these to need any other. But as she gets stronger, the day passes heavily, and the ordinary sick-room gossip is hardly sufficient to satisfy any but very ignorant or very common minds. If you are able to read nicely, as you ought to be, you may thus be a great comfort to her. A chapter of The Book, to which all turn in sorrow and in suffering, read in the morning, after washing and dressing, will calm and compose her mind: and occasionally through the day, a few pages of an interesting but not exciting work, will make the time pass very pleasantly. For some few days the patient ought not to read herself, but as she gets stronger, she will become uncomfortable if unoccupied, and provided the bed be placed sideways to the light, there can be no objection to her reading a little. When she sits up, she will, of course, be able to find employment that will not fatigue her.

SYMPTOMS ADAPTED TO CREATE ALARM. — Having thus treated pretty fully of the phenomena of childbed, with certain deviations from the common course, and the necessary treatment of each, I trust you will find no difficulty in the ordinary management of lying-in women; but as you know that very dangerous attacks occur at this period, especially when puerperal fever is epidemic, which it is of the highest importance to have checked at the very commencement; and as some of the symptoms I have noticed, have a strong resemblance to the beginnings of disease, it may be well to draw your attention to some circumstances which ought to excite your alarm, and induce you to call in assistance as soon as possible.

1. The occurrence of rigors, particularly on the second or third day, if the breasts are not full and hard, and especially if there be any pain in the belly. I have already spoken of the urgency of this symptom, and told you how to distinguish between shivering from the milk and from inflammation. If you cannot fairly attribute it to the milk, you will not lose a moment in sending for the doctor; if you delay but a few hours, the patient may be past help. Meantime, however, you may apply a fomentation to the belly, but take care how you do it. Place a blanket folded lengthways under the patient, and next to her body; then wring out flannels in hot water, and apply them, but not too wet; then fold the ends of the blanket over all, and repeat this in ten minutes. Not a drop of water should be allowed to fall on the bed or night-clothes, and when you finish the fomentation, dry the patient thoroughly, and place a warm, dry flannel all over the abdomen. Or, instead of the fomentation, you may apply a poultice of scalded bran (in a flannel bag), or of linseed meal: the latter should be made thin and sloppy, or it will become hard, and applied as hot as the patient can bear it.

2. The occurrence of weakness or fainting, without special cause, or after having been raised in bed, is most alarming. In such a case, lay the patient quite flat in bed, and give a little wine, but summon the doctor instantly.

3. The same treatment will be necessary, in case of any oppression or unusual difficulty of breathing.

4. Severe pain in the uterus, extending down the thighs, even if it be only an exaggerated after-pain, demands relief; and as it may be more than this, viz., the commencement of inflammation, you had better obtain assistance, especially if it be preceded or accompanied by shivering.

5. The sudden stoppage of the lochia—especially if the milk be not abundant, or, on the other hand, an unusually profuse discharge—is too serious a matter to be neglected. Until you obtain assistance, you may, in the former case, safely apply a poultice to the lower part of the abdomen; and in the latter, if the discharge amount to flooding, after tightening the binder, you may dip a napkin in cold water and apply it for a moment to the external parts. Do not make a slop about the patient, and do not let the wet napkin remain in contact with her, as it does no good after the first impression of cold.

6. An attack of vomiting or diarrhœa may occur without apparent cause, or as the consequence of repeated doses of medicine, and it is never to be overlooked. If it continue beyond a very short time, you had better call in a doctor.

7. If, after repeated and moderate attempts, aided by the means already recommended, your patient cannot pass water within ten or twelve hours, professional assistance will be necessary. Such cases rarely occur, except with first children, or where the second stage has been unusually prolonged; but when it does happen, you must neither rely upon your own remedies, nor allow time to be lost.

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